Minnesota State Capitol Repairs, Restoration & Preservation

St. Paul, Minnesota

Project Manual

Work Package No. 1

Divisions 00-32, with Appendix

Hammel, Green and Abrahamson, Inc
Architects and Engineers
420 5th Street North, Suite 100
Minneapolis, Minnesota 55401-2338
(612) 758-4000

HGA Commission Number
0476-061-00
MSC Project #SCB-02CB0015

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June 21, 2013

SECTION 000105
CERTIFICATIONS PAGE

CIVIL

I hereby certify that the plans and specifications for Civil Engineering Work were prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Name: Kenneth Horns Registration No. 18235

ARCHITECTURAL

I hereby certify that the plans and specifications for Architectural Work were prepared by me or under my direct supervision and that I am a duly Licensed Architect under the laws of the State of Minnesota.

Name: Michael Bjornberg Registration No. 16901

MECHANICAL

I hereby certify that the plans and specifications for Mechanical Work were prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Name: Jeffrey W. Harris Registration No. 21522

PLUMBING

I hereby certify that the plans and specifications for Plumbing Work were prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Name: Tracy Renee La Vere Registration No. 42015

ELECTRICAL

I hereby certify that the plans and specifications for Electrical Work were prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Name: Leigh P. Harrison Registration No. 40448

FIRE PROTECTION ENGINEER

I hereby certify that the plans and specifications for Fire Protection were prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Name: Daniel J. Picciano Registration No. 47927

END OF DOCUMENT

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JUNE 19, 2013

MINNESOTA STATE CAPITOL – REPAIRS, RESTORATION AND PRESERVATION

WORK PACKAGE NO. 01

OWNER

STATE OF MINNESOTA
DEPARTMENT OF ADMINISTRATION,
REAL ESTATE AND CONSTRUCTION SERVICES
50 SHERBURNE AVE.
ST. PAUL, MN 55155

ARCHITECT

HAMMEL, GREEN, AND ABRAHAMSON, INC.
701 WASHINGTON AVE.
MINNEAPOLIS, MN 55401

CONTRACTOR

J.E. DUNN CONSTRUCTION COMPANY
9855 WEST 78TH ST. SUITE 270
EDEN PRAIRIE, MN 55344
[JIM RINNER (785) 270-1424

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SECTION 00 11 16
INVITATION TO BID

June 19, 2013

Re: *Minnesota State Capitol – Repairs, Restoration and Preservation*
75 Rev. Martin Luther King Jr. Blvd. St. Paul, MN 55115

Ladies and Gentlemen:

J.E. Dunn Construction Company, hereafter referred as the **Contractor**, has issued bid documents for the project described below and requests your bid proposal on the Scopes of Work identified in this Front End.

The following list highlights information associated with the Project that may be helpful in your bidding process. Bidders should review the Bidding Documents in their entirety for a complete discussion of the items highlighted below.

PROJECT NAME	*Minnesota State Capitol – Repairs, Restoration and Preservation (WP-1)*
PROJECT DESCRIPTION	*Work Package No. 01: Grading and paving for (2) temporary parking lots to the south of the State Capitol and interior demolition at the Terrace Level within the Capitol.*
PRE-BID CONFERENCE	A Pre-bid Conference will be held at *State Capitol (Front Entrance)* located at *75 Rev. Martin Luther King Jr. Blvd. St. Paul, MN 55115* at *3:00 PM on July 9th* for the purpose of answering any questions from prospective Bidders regarding the Scopes of Work on the Project. Attendance is strongly recommended. No other Pre-Bid Conference will be held.
BIDDING DOCUMENTS	Bidding Documents are available for viewing at JE Dunn's office located at *9855 W. 78th St, Suite 270 Eden Prairie, MN 55344.* Bidding Documents may also be viewed and/or obtained electronically at www.smartbidnet.com.
BID PROPOSAL	Use the Bid Proposal Form in Section 00 41 23.
BID DUE DATE	**Bids will be received until *2:00 PM* on *July 12th*.** Bids will be received by the Contractor at *9855 W. 78th St, Suite 270 Eden Prairie, MN 55344.* Please direct all Bids to the attention of Jim Rinner. Bids can be submitted by facsimile at *952-833-5995* or by e-mail at *Jim.Rinner@jedunn.com* .
LENGTH OF VALIDITY OF BID	All Bids shall be valid for acceptance by the Contractor for a period of **Sixty (60) calendar days** after submission of the Bid(s).
INTERPRETATION AND ADDENDA	Requests for interpretations, clarifications, corrections or changes of the Bidding Documents must be made in writing at least **seven (7) calendar days** prior to the date for receipt of Bids. No Addenda will be issued later **than one (1) business days** prior to the date for receipt of Bids except for the limited situations set forth in the Instructions to Bidders.

SUBSTITUTIONS	Substitutions will be allowed as provided in the Instructions to Bidders and pursuant to Division 01.]
INSURANCE REQUIREMENTS	Insurance requirements are included in the Controlled Insurance Manual included herein. Subcontractors will not be allowed on site until they have fully complied with the insurance requirements.
PREVAILING WAGES	[Prevailing wages <u>are required</u> on this Project.]
MBE/WBE GOALS	[MBE/WBE goals <u>are required</u> on this Project. Section 00 73 36 identifies the specific project labor goals.
TAXES/EXEMPTIONS	This Project is not exempt from state sales and use tax.
OTHER SPECIAL REQUIREMENTS	There are no other special requirements on this Project.
QUESTIONS	All questions regarding this Division 00 should be directed to the Contractor.

Please refer to the Instructions to Bidders for further information. All Bids are to be in strict accordance with the Bidding Documents and all related Bidding Requirements and Subcontract Documents.

<u>BID DOCUMENTS:</u>

Available at www.smartbidnet.com

Contractor reserves the right to reject any or all bids, waive any irregularities or award the work to someone other than the low Bidder.

We look forward to receiving your Bid(s). If you have any questions or require further assistance, please contact the undersigned.

Sincerely,

Jim Rinner
J.E. Dunn Construction Company

cc: File

SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

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1. GENERAL

1.1. The Project is being constructed through a design-bid-build delivery method where the work will be subcontracted and coordinated by the Contractor.

1.2. Selected Subcontractors and Suppliers have been invited to submit a Lump Sum Bid for the construction of the Work described in the Bidding Documents.

1.3. Bidders are required to study carefully and conform to these instructions in order that their Bid(s) be complete, responsive and acceptable.

1.4. The Project will be delivered on a fast-track basis with portions of the Project being constructed while other portions of the Project are being finally designed.

2. DEFINITIONS

2.1. Addenda are written or graphic instruments issued by the Architect prior to the execution of the Subcontract which modify or interpret the Bidding Documents by addition, deletion, clarification or correction.

2.2. An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents and the Specifications, is accepted by the Owner.

2.3. The Architect is the architectural firm identified herein which has entered into a contractual agreement with the Owner to provide certain design services for the Project. The term Architect shall also refer to its subconsultants.

2.4. The Base Bid is the amount stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or deleted for amounts stated in Alternate Bids and Unit Prices.

2.5. A Bid is an offer of a Bidder submitted on the prescribed form contained in the Bidding Documents or a complete and properly signed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

2.6. A Bidder is a person or entity who submits a Bid for the labor and material

described in the Scope of Work set forth in the Bid Proposal.

2.7. Bidding Documents include the Bidding Requirements, the Subcontract Documents and the other documents included or identified in the Project Manual that could impact a Bid.

2.8. The Bidding Requirements consist of the Invitation to Bid, Instructions to Bidders and other sample bidding and other forms contained in the Project Manual and all Addenda describing the bidding process.

2.9. Contractor, whether as a General Contractor or Construction Manager at Risk, shall refer to the contractor named in the Invitation to Bid which has entered into an agreement with Owner to provide construction services on the Project.

2.10. The Scope of Work is the Work described and identified for a specific aspect of the Project.

2.11. The Subcontract Documents consist of the form of Agreement between the Owner and Contractor ("Prime Contract"), form of Agreement between Contractor and Subcontractor ("Subcontract") or Material & Equipment Agreement form ("M&E Agreement"), General Conditions, Supplementary Conditions, Drawings, Specifications, all Addenda issued prior to execution of the Subcontract and other documents identified in the Subcontract or M&E Agreement.

2.12. Subcontractor shall refer to the entity that will enter into a contractual agreement with the Contractor to provide labor and material for a particular Scope of Work.

2.13. The Successful Bidder is the responsible Bidder who submits the lowest and best Bid responsive to the Bidding Requirements and to whom the Contractor, on the basis of the Contractor's evaluation, will make an award of Subcontract.

2.14. Supplier shall refer to the entity that will enter into a contractual agreement with the Contractor to supply material and/or equipment for the Project.

2.15. A Unit Price is an amount stated in the Bid as a price per unit of measurement for material, equipment or labor as described in the Bidding Documents.

2.16. The Work means the construction and services required by the Subcontract Documents including all labor, material, equipment and services provided or to be provided by the Subcontractor to fulfill the Subcontractor's obligation under the Subcontract Documents.

2.17. The word furnish when used means furnish completely, including all work and associated costs for: materials, shop drawings, transportation, insurance, field measurements, expediting, shipping, handling, packaging, storage, touch up materials, owners manuals, training, and any other accessories required for a complete installation. Shipping methods and delivery dates for furnished items shall be coordinated with the receiver/ installer and shall include all reasonable provisions required for unloading. (Proper container, lift gate if required.)

2.18. The word install when used means install completely, including all work and associated costs for: receiving, unloading, unpacking, verification of quantity and condition, inventorying, hoisting, rigging, equipment, lifts, storage, hangars, supports, sleeves, coordination, layout, shop drawings, review of shop drawings by others, field measurements, excavation, backfill, dewatering, installation, cutting and patching, firestopping, daily clean up, inspections, documentation, protection of own work and work of others, rough-in, testing, as-built drawings, and all other accessories, services and facilities required for a complete installation. Repair or replace items damaged, misplaced, stolen, or otherwise deemed unfit for installation as determined by the Architect after proper inventorying of materials and/or equipment supplied by others.

2.19. The word provide when used means furnish and install completely, including all

work and associated costs for: furnishing, installing, materials, labor, equipment, layout, tools, and any other temporary or permanent facilities required to complete the work.

2.20. Terms of art and other words not specifically defined herein have the same meaning as those used and/or defined in the Subcontract Documents.

3. THE BIDDING DOCUMENTS

3.1. Bidders shall use complete sets of Bidding Documents in preparing Bids. Neither the Owner, the Contractor nor the Architect shall assume any responsibility for errors, mistakes, misrepresentations or incomplete bids resulting from the use of incomplete sets of Bidding Documents.

3.2. In making copies of the Bidding Documents available, the Owner, Architect and Contractor do so only for the purpose of obtaining Bids on the Scopes of Work and do not confer a license or grant permission to use the Bidding Documents for any other purpose.

4. EXAMINATION OF BIDDING DOCUMENTS AND SITE

4.1. It is the responsibility of each Bidder, before submitting a Bid, to

4.1.1. carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Scope of Work for which the Bid is submitted,

4.1.2. visit and examine the Project site to become familiar with local conditions that may effect cost, progress, performance or furnishing of the services or Work;

4.1.3. consider federal, state and local laws and regulations that may affect cost, progress, performance or furnishing of the services or Work; and

4.1.4. notify the Contractor immediately of all conflicts, errors, inconsistencies or ambiguities discovered by Bidder in the Bidding Documents.

4.2. **Site Information**

4.2.1. Within the Bidding Documents, there **may** be reports of explorations and tests of subsurface conditions at or contiguous to the site of the Project ("Geotech Reports"). If Geotech Reports are not included in the Bidding Documents, they will be made available to Bidders upon request. It is strongly recommended that those who are bidding on a Scope of Work which may be impacted by subsurface conditions obtain and/or review the Geotech Reports.

4.2.2. The Bidding Documents **may** identify reports and/or drawings relating to Asbestos, PCB, Petroleum, Hazardous Waste, Radioactive Material or other hazardous materials ("Hazardous Materials"). Copies of these reports and drawings will be made available to Bidders upon request. Provisions relating to responsibilities for such conditions are set forth in the Subcontract Documents.

4.2.3. These reports, drawings and other documents referenced in this section are not part of the Subcontract Documents. The Bidder is responsible for any interpretation, extrapolation or conclusion it draws from any technical data or any other data, interpretations, opinions or information contained in such reports or drawings or shown or indicated in other documents related to subsurface conditions or Hazardous Materials.

4.3. Upon reasonable notice, Contractor and/or Owner will provide each Bidder access to the site to conduct such examinations, inspections and studies as each Bidder deems necessary for submission of a Bid.

5. INTERPRETATIONS AND ADDENDA

5.1. All questions regarding the meaning or intent of the Bidding Documents are to be directed to the Contractor who will forward such questions to the Architect, if needed.

5.2. Bidders shall promptly notify the Contractor of any ambiguity, inconsistency or error which they discover upon examination of

the Bidding Documents, the Project site and the local conditions.

5.3. Bidders requiring interpretation, clarification, correction or change of the Bidding Documents shall make a written request which must reach the Contractor within the time set forth in the Invitation to Bid.

5.4. Requests received less than the time set forth in the Invitation to Bid **may** not be answered.

5.5. Interpretations, clarifications, corrections and changes to the Bidding Documents considered necessary by the Contractor or Architect in response to such questions or otherwise will be made by Addenda.

5.6. No Addenda will be issued later than the time set forth in the Invitation to Bid except for an Addendum withdrawing the request for Bids or postponing the date for receipt of Bids.

5.7. Reasonable efforts will be made to fax or deliver notifications of Addenda to all who are known to have received a complete set of Bidding Documents.

5.8. Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

5.9. It is the responsibility of each Bidder to ascertain and confirm, prior to submitting a Bid, that the Bidder has received all Addenda. Each Bidder shall also acknowledge its receipt of all Addenda in its Bid(s). Owner, Contractor and Architect are not responsible for errors or omissions in Bids from Bidders who have not received all Addenda.

5.10. Only interpretations, clarifications, corrections and changes made by formal written Addenda will be binding. Interpretations, clarifications, corrections and changes to the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon them.

5.11. In the case of an ambiguity, inconsistency or error in Bidding Documents not clarified by Addendum, the higher quality, more expensive option and/or greater quantity of Work shall be provided in accordance with the Contractor's interpretation.

5.12. Failure of the Bidder to notify the Contractor or Architect of a known ambiguity, inconsistency or error in the Bidding Documents will waive the Bidder's right to seek additional compensation for such ambiguity, inconsistency or error.

6. SUBSTITUTIONS

6.1. Reference in the Specifications to any product, material, equipment, type or form of construction shall establish a minimum standard of quality and shall not be construed as limiting competition.

6.2. The products, materials and equipment described in the Bidding Documents establish a standard of required design, spare parts availability, strength, durability, usefulness, serviceability, operating cost, convenience, and for the purpose intended to be met by any proposed substitution.

6.3. Reference to standard specifications for basic materials shall not be modified for any substitutions proposed.

6.4. No request for substitution will be considered prior to receipt of Bids unless a written request for approval has been received by the Contractor or Architect within the time set forth in the Invitation to Bid. **Requests for substitution will not be considered when proposed with a Bid.**

6.5. Requests for substitutions will only be considered under the following procedures:

6.5.1. The request is made under the "*or approved equal*" or the "*or approved substitute*" provisions of the Subcontract Documents.

6.5.2. The request is received within the time period set forth in the Invitation to Bid.

6.5.3. Each request includes the name of the material, product, equipment or system for which it is to be substituted, correlated to specification section and page; all basic data

and characteristics of the proposed substitute so that a direct comparison may readily be made.

6.5.4. The request complies completely with the other requirements for substitutions set form in Division 01.

6.6. It is the sole responsibility of the Bidder making the request to submit complete descriptive and technical information necessary for the Architect to evaluate the substitution.

6.7. The burden of proof of the merit of the proposed substitution is upon the Bidder making the request. **The Architect's decision of approval or disapproval of a proposed substitution shall be final.**

6.8. If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth by written Addendum. An approval of a request for substitution made in any other manner will not be binding, and Bidders shall not rely upon an approval made in any other manner.

6.9. No substitutions will be allowed subsequent to the Subcontract award unless specifically provided for in the Subcontract Documents.

7. PRE-BID CONFERENCE

7.1. A pre-bid conference will be held at the date, time and location stated in the Invitation to Bid.

7.2. Representatives of Owner, Architect and Contractor will be present to discuss the Project and answer questions regarding the Bidding Documents and bidding procedure. Bidders are encouraged to attend and participate in the conference.

8. TIME AND PLACE TO RECEIVE BIDS

8.1. Contractor will receive Bids until the time on the date indicated in the Invitation to Bid or indicated by Addendum. Bids received after this time may not be accepted.

8.2. Bids shall be submitted at the place indicated in the Invitation to Bidders or indicated by Addendum. Bidders shall assume full responsibility for timely delivery at the location designated for receipt of Bids. [Bids can be submitted by facsimile or e-mail via the numbers and email address provided in the Invitation to Bid.]

9. THE BID

9.1. Lump Sum Bids will be received from Bidders for the Scopes of Work identified in the Bidding Documents. Bids shall include all Work defined within the Scope of Work, including but not limited to the relevant Specification Section(s).

9.2. Bids are to include all overhead, profit, labor, applicable taxes, insurance, licenses, permits, tools, equipment, materials, services, labor, supervision and incidentals necessary or required for the completion of the Scopes of Work identified in the Bidding Documents.

9.3. No Bidder may submit more than one (1) Bid per Scope of Work. Multiple Bids for the same Scope of Work from an individual or entity under the same or different names will not be considered.

10. PRE-QUALIFICATION OF BIDDERS

10.1. All Bidders must be qualified to perform the Work described in the Bidding Documents. All Bidders must demonstrate their ability, experience, technical expertise, efficiency, integrity, reputation, capacity of personnel and financial resources to properly and timely perform the Work described in the Bidding Documents to be considered a responsible Bidder.

10.2. To be qualified to perform the Work described in the Bidding Documents, the Bidder must submit and/or update the necessary information on Contractor's online Subcontractor Management System located at www.jedunn.com/spq/.

10.3. Only invited Bidders that are qualified may Bid the Project. The Contractor or Owner may reject proposals or Bids from non-invited and/or non-qualified firms. Contact Contractor for information regarding qualifying to Bid the Project.

11. BIDDER REPRESENTATIONS

11.1. Each Bidder, by submitting its Bid, represents that:

11.1.1. The Bidder has examined, carefully studied and understands the Bidding Documents, including all Addenda and other related information, and its Bid is made in accordance therewith.

11.1.2. The Bidder has read and understands the Subcontract Documents to the extent that such documentation relates to the Scope of Work for which its Bid is submitted, and for other portions of the Project, if any, being bid concurrently or presently under construction.

11.1.3. The Bidder has visited the site, familiarized itself with the local conditions under which the Work is to be performed and has correlated its observations with the requirements of the proposed Subcontract Documents.

11.1.4. The Bidder is familiar with all federal, state and local Laws and Regulations that may affect cost, progress or performance of the Work.

11.1.5. The Bid is based upon materials, equipment and systems required by the Bidding Documents without exception unless otherwise approved.

11.1.6. The Bidder will not later request, and will not later expect to receive, additional payment for Work related to conditions which could have been determined by examination of the site and the Bidding Documents.

11.1.7. The Bidder will agree to contract under the Subcontract Documents as provided (including project-specific modifications, if any, made at a later time) without clarification or modification.

11.2. By submitting a Bid, Bidder agrees that any protest, controversy, dispute or claim arising from the Invitation to Bidders, the Bidder's submission of the Bid, the Owner's or Contractor's rejection of any Bid and/or the award of a Subcontract or M&E Agreement shall be subject to the same dispute resolution requirements as are set forth in the Subcontract Documents, which are incorporated herein by this reference.

12. MODIFICATION AND WITHDRAWAL OF BIDS

12.1. Bid may be modified or withdrawn any time prior to the time for receipt of Bids indicated in the Invitation to Bidders.

12.2. Bids may not be withdrawn, modified or canceled for the period of time set forth in the Invitation to Bid following the time and date for the receipt of Bids.

13. REJECTION OF BIDS

13.1. The Contractor and/or Owner reserve the right to reject any or all Bids, including, without limitation, the right to reject Bids that are incomplete, irregular, nonconforming, nonresponsive, unbalanced or conditional.

14. ACCEPTANCE OF BID (AWARD)

14.1. It is the intent of the Contractor to award a Subcontract or M&E Agreement to the lowest, responsible Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents.

14.2. In awarding the Subcontract or M&E Agreement, the Contractor may take into consideration the Bidder's skill, facilities, capacity, experience, responsibility, previous work record and financial standing; and, the necessity of prompt and efficient completion of work herein described. The inability of any Bidder to meet the requirements mentioned above may be cause for rejection of the Bid.

14.3. The Contractor and/or Owner may interview any and all Bidders before the Subcontract or M&E Agreement is awarded. The interview will enable the Contractor and Owner to ask the Bidder questions about materials, labor, duration, Scope of Work, the Subcontract Documents or the Bidder's qualifications and abilities.

14.4. The Contractor and Owner shall have the right to waive informalities or irregularities in a Bid received and to accept the Bid which, in the their judgment, is in the Owner's and Contractor's best interest.

14.5. The Owner and Contractor shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternate(s) accepted.

15. SCHEDULE

15.1. The Bidder agrees that if awarded the Subcontract or M&E Agreement it will substantially complete the Work in accordance with the schedule developed by the Contractor. A construction milestone schedule has been included in Section 00 31 13. A detailed project schedule is available at Contractor's office and is available for review by all Bidders.

15.2. The Bidder hereby agrees to commence work under the Subcontract or M&E Agreement within **seven (7) calendar days** after the date of a "Notice to Proceed", unless otherwise stipulated in that notice.

16. SUBCONTRACTOR DEFAULT

16.1. Performance And Payment Bond

16.1.1. The Bidder shall indicate the actual cost to furnish bonds covering the faithful performance of this Subcontract and payment of all obligations arising thereunder. Bonds shall be issued by a surety company that is rated "A-" or better by A.M. Best Company. The surety shall have a per bond underwriting limit set forth in the most current United States Treasury Circular 570 List that is greater than or equal to the face value of the bond.

16.1.2. Bonds (if required) shall be written on forms approved by the Contractor. Bonds shall be written in full amount of the Contract Sum and shall name the Contractor as obligee. The approved bond form is included as Section 00 61 13.

16.1.3. Contractor will only pay for the actual cost of the bond based upon an invoice from the surety.

17. INSURANCE

17.1.1. This Project will have a Controlled Insurance Program ("CIP"), as set forth in the Project Insurance Manual. The Project Insurance Manual IS a Contract Document that describes the requirements and procedures of the CIP.

17.1.2. All Bidders shall include in their base bid the cost of providing the insurance required by the Controlled Insurance Manual, but excluding the cost of onsite General Liability coverage.]

17.1.3. In addition, all Bidders shall include the cost of complying with the safety requirements contained herein and in the Project Insurance Manual.

18. FORM OF AGREEMENT BETWEEN THE CONTRACTOR AND SUBCONTRACTOR

18.1. The Agreement for the Work will be the AIA Document, A401, 2007 Edition, as modified and amended, including all General, Supplemental or Special Conditions ("Subcontract"). See Section 00 52 00.

18.2. The Subcontract may be modified from the form included to reflect Project-specific provisions required by the Owner. Otherwise, the Subcontract shall not be changed from the form that is included. The Bidder shall include in its Bid all costs associated with executing the Subcontract as provided in Section 00 52 00.

19. FORM OF AGREEMENT BETWEEN THE CONTRACTOR AND SUPPLIER

19.1. The Agreement for the providing of material, goods or equipment will be the Material & Equipment Agreement, including all General Supplemental or Special Conditions ("M&E Agreement"). See Section 00 52 00.

19.2. The M&E Agreement may be modified from the form included to reflect project-specific provisions required by the

Owner. Otherwise, the M&E Agreement shall not be changed from the form that is included. The Bidder shall include in its Bid all costs associated with executing the M&E Agreement as provided in Section 00 52 00.

20. LABOR HARMONY

20.1. The Bidder hereby acknowledges that the Contractor may be a party to certain collective bargaining agreements with various union crafts, which agreements may affect the work of subcontractors while working on this project. Bidder agrees that, to the extent any such agreement is applicable to the on-site construction work performed by the Bidder on this Project, it shall take all steps necessary to comply with the subcontractor articles or other applicable provisions of the Contractor's collective bargaining agreements. If any portion of the Bidder's Work is further subcontracted, then second tier subcontractors shall be bound by and observe all terms and provisions of such collective bargaining agreements to the same extent as is hereby required of the Bidder.

20.2. Contractor is signatory to agreements with the following crafts:

- Carpenters
- Laborers
- Operating Engineers
- Cement Masons
- Brick Masons

21. PREVAILING WAGE

21.1. Bids shall be based on payment of wage rates not less than the prevailing hourly wage for each craft or classification of workmen engage on the Work as determined by the Minnesota Department of Labor and Industry.

21.2. See Section 00 73 43 and http://mn.gov/mdhr/compliance/faq_goals.html for more information regarding prevailing wage requirements.

SECTION 00 24 13
SCOPE(S) OF WORK

INDEX TO SCOPES OF WORK

Bids: July 12, 2013

A. Scope of Work No. 01 - Swing Parking
B. Scope of Work No. 02 - Demolition – Terrace Level

Provide all labor and materials, tools, equipment, supervision, profit, overhead and other items necessary to furnish and install the Scope of Work assigned, as required by the Subcontract Documents, Bidding Documents, Scope of Work and other items as issued by Addenda.

SECTION 00 24 13

[EXAMPLE - Individual Scope of Work]

SCOPE OF WORK

The Subcontractor shall execute the following portion of the Work described in the Subcontract Documents, including all labor, materials, equipment, services, on site supervision, and other items required to complete such portion of the work:

[Scope of Work] – Including, but not limited to, Specification Sections:

- [Specification Sections and Title]

The work specifically includes, but is not limited to:

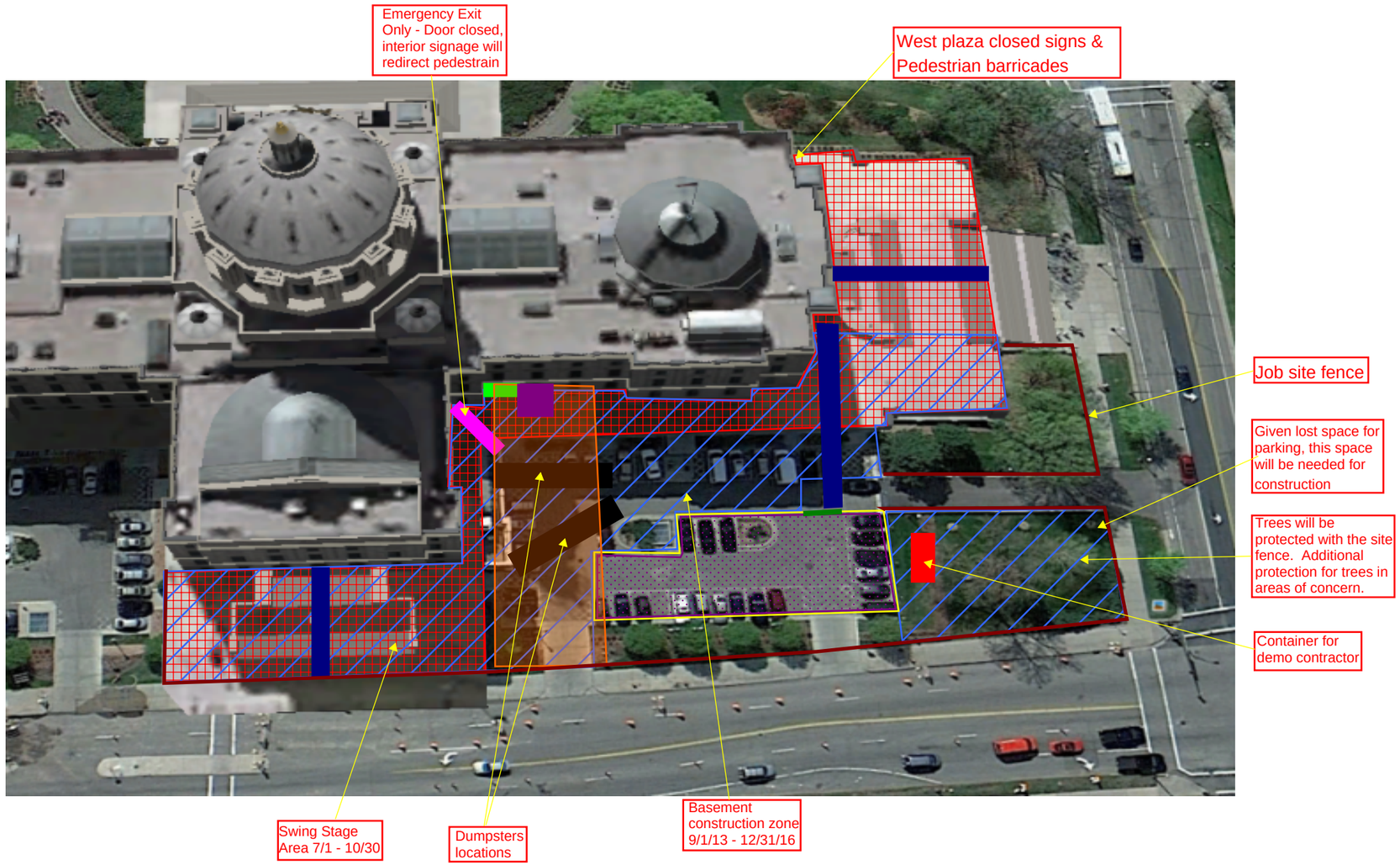
1) [Description of Work to include].

This Subcontract <u>excludes</u> the following work:

1) [Description of Work to exclude]

SECTION 00 30 00
SITE ACCESS PLAN

Parking Lot N Logistics
2013-2014
June 14, 2013 (revised)



Parking Lot N Logistics

- -Executive parking until June 1, 2014.
- -Field Measuring work zone starting July 1, 2013.
- -Basement staging area and work zone starting September 1, 2013.
- -Temporary parking area (turned over to construction 6-30-13).
- -Parking lot gate.
- -Overhead protection for building access.
- -Potential location for basement access and debris removal.
- -Dumpsters.
- -Container for demo contractor.
- -Emergency Exit Only.
- -Plywood protection of new concrete surface.
- -Site Fence
- -Material host for interior construction "Skip" ground to roof. (See attached photo)

SECTION 00 31 13
MILESTONE SCHEDULE OF CONSTRUCTION

Bidders recognize that revisions in the planned schedule are inherent in the nature of construction. This may result in revisions to the schedule of construction for the Project and the Bidders' Work during the progress of construction. Bidders acknowledge that Owner or Contractor cannot guarantee Bidders, if selected, will be able to start the Work on any particular date or continue without interruption once started. Bidders shall include in their Bid all costs associated with this risk.

--PLACE HOLDER--

PROJECT SCHEDULE TO BE ISSUED BY ADDENDUM

SECTION 00 41 23
BID PROPOSAL FORM

Minnesota State Capital – Repairs, Restoration, and Preservation
Work Package No. 01
MSC Project #02CB0015

BID FOR LUMP SUM CONTRACT

Date: _____

BID OF (Company name) _____

Phone Number:_____

Main Contact:_____

TO: JE Dunn Construction
Attn. Jim Rinner
9855 West 78th Street
Suite 270
Eden Prairie, MN 55344

1. Bidder, in compliance with invitation for bids for construction work in accordance with Drawings and Specifications prepared by Hammel, Green, and Abrahamson, Inc., for the above mentioned project, dated _____ having examined Contract Documents and site of proposed work, and being familiar with all conditions pertaining to construction of proposed project, including availability of materials and labor, hereby proposes to furnish all labor, materials and supplies to construct project in accordance with Contract Documents, within time set forth herein at prices stated below. Prices shall cover all expenses, including all taxes incurred in performing work required under Contract documents, of which this Bid is a part.

   Bidder acknowledges receipt of following addenda:

   Addendum No. _____Dated _____
   Addendum No. _____Dated _____
   Addendum No. _____Dated _____
   Addendum No. _____Dated _____

2. In following Bid(s), amount(s) shall be written in both words and figures. In case of discrepancy between words and figures, words shall govern.

3. BID PRICING
   a. Bid for Work Scope No. (refer to 00 24 13)_____

   b. Base Bid: The Bidder agrees to furnish all labor, materials, tools, and equipment required; all as indicated on the Drawings and described in these Specifications for sum of: _____
   _____DOLLARS ($_____).

4. UNIT PRICES:

a. For changing specified quantities of work from those indicated by Contract Drawings and Specifications, upon written instructions of Owner, the following Unit Prices shall prevail in accordance with General Conditions.

b. The following Unit Prices include all labor, overhead and profit, materials, equipment, appliances, bailing, shoring, shoring removal, etc., to cover all work.

c. The following Unit Prices are required where applicable to particular Base Bid and/or Alternate being submitted.

d. Only a single Unit Price shall be given and it shall apply for either MORE or LESS work than that indicated on Drawings and called for in Specifications as indicated to be included in Base Bid and/or Alternates. In the event that more or less units than so indicated is actually furnished, Change Orders will be issued for increased or decreased amounts as approved by the Owner.

e. Bidder understands that the Owner will not be liable for any Unit Price or any amount in excess of Base Bid and any Alternate(s) accepted at time of award of Contract, except as expressed in written Change Orders duly executed and delivered by Owner's Representative.

f. Unit Prices

1. (No. 01) Unsuitable Material: Remove Unsuitable Material (off-site disposal): Provide a price per cubic yard (in place) for removal of unsuitable material and properly disposing of the material off-site as indicated in Section 310000.

   $_____/_____Unit $_____ Add / Deduct

2. (No. 02) Select Granular Material (borrow): Provide a price per cubic yard (in place) for importing and placing "Select Granular Material" in accordance with the specified requirements for Primary Fill to replace Unsuitable Material as indicated in Section 310000.

   $_____/_____Unit $_____ Add / Deduct

3. (No. 03) Description: Remove Unsuitable Material (off-site disposal): Provide a price per cubic yard (in place) for removal of unsuitable material and properly disposing of the material off-site as indicated in Section 310000.

   $_____/_____Unit $_____ Add / Deduct

4. (No. 04) Stabilization Geotextile: Provide a unit price per square yard (installed) to furnish and place a stabilization geotextile on sub-grade as indicated in Section 310000.

   $_____/_____Unit $_____ Add / Deduct

5. (No. 05) Boulders: Base bid includes removing from the site boulders up to 1 cubic yard. Provide a unit price per cubic yard for removing boulders larger than 1 cubic yard and properly disposing off-site as indicated in Section 310000.

$_____/_____Unit $_____Add / Deduct

5. PROJECT LABOR GOALS

a. The Contractor shall have as a goal subcontracting with 11% Targeted Group Businesses (TGB), 32% Minority Labor, 6% Female Labor of awarded contract price for work to be performed.

b. The Undersigned proposes to perform work with following MBE/WBE participation level:

Targeted Group Businesses: (_____%)
Minority Labor: (_____%)
Female Labor: (_____%)

c. If the goals mentioned in 4a are not met, provide a value adjustment to the bid to obtain 100% compliance with the goals.

_____
_____DOLLARS ($_____).

6. BIDDER'S ACKNOWLEDGMENTS

a. Bidder declares that he has had an opportunity to examine the site of the work and he has examined Contract Documents therefore; that he has carefully prepared his bid upon the basis thereof; that he has carefully examined and checked bid, materials, equipment and labor required thereunder, cost thereof, and his figures therefore. Bidder hereby states that amount, or amounts, set forth in bid is, or are, correct and that no mistake or error has occurred in bid or in Bidder's computations upon which this bid is based. Bidder agrees that he will make no claim for reformation, modifications, revisions or correction of bid after scheduled closing time for receipt of bids.

b. Bidder understands that Owner reserves right to reject any or all bids and to waive any informalities in bidding.

7. BIDDER'S CERTIFICATE

Bidder hereby certifies:

a. The bid is genuine and is not made in interest of or on behalf of any undisclosed person, firm or corporation, and is not submitted in conformity with any agreement or rules of any group, association or corporation.

b. Bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid.

c. Bidder has not solicited or induced any person, firm or corporation to refrain from bidding.

d. Bidder has not sought by collusion or otherwise to obtain any advantage over any other Bidder or over Owner.

e. Bidder will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin in connection with performance of work.

7. BIDDER'S SIGNATURE

Note: All signatures shall be original; not copies, photocopies, stamped, etc.

Authorized Signature	Date
Printed Name	Title
Company Name	
Mailing Address	
City, State, Zip	
Phone No.	Federal Employer ID No.
Fax No.	E-Mail Address
Circle one: Individual Partnership Corporation Joint Venture	
If a corporation, incorporated under the laws of the State of_____	
Subcontractors are to be registered with the MN Dept. of Labor and Industry and are required to have a registration No. prior to receiving an award. Building Construction Contractor Registration No. _____ Or License No.: _____ Type of License:_____	

(Each Bidder shall complete bid form by manually signing on the proper signature line above and supplying required information called for in connection with the signature. Information is necessary for proper preparation of the Contract, Performance Bond and Payment Bond.")

END OF SECTION

SECTION 00 52 00
CONTRACT BETWEEN CONTRACTOR and SUBCONTRACTOR

[AIA A401 Subcontract, as modified]

The Subcontract may be modified from the form included to reflect Project-specific provisions required by the Owner. Otherwise, the Subcontract shall not be changed from the form that is included. The Bidder shall include in its Bid all costs associated with executing the Subcontract unconditionally and as provided in this Section.

AIA® Document A401™ – 2007

Standard Form of Agreement Between Contractor and Subcontractor

AGREEMENT made as of the day of in the year Two Thousand and _____
(In words, indicate day, month and year.)

BETWEEN the Contractor:
(Name, address and other information)

J.E. Dunn Construction Company
9855 W. 78th Street, Suite 270
Eden Prairie, Minnesota 55344
and the Subcontractor:
(Name, address and other information)

The Contractor has made a contract for construction (hereinafter, the Prime Contract)

with the Owner:
(Name, address and other information)

State of Minnesota
Department of Administration, Real Estate and Construction Services
309 Administration Building
50 Sherburne Avenue
St. Paul, Minnesota 55155

for the following Project:
(Name, location and detailed description)

The Repairs and Restoration to the Minnesota State Capitol Building
St. Paul, Minnesota

The Prime Contract provides for the furnishing of labor, materials, equipment and services in connection with the construction of the Project. A copy of the Prime Contract, consisting of the Agreement Between Owner and Contractor (from which confidential and proprietary information may be deleted) and the other Contract Documents enumerated therein will be made available upon request.

The Architect for the Project:
(Name, address and other information)

Hammel, Green, Abrahamson (HGA), Inc.
420 5th Street North, Suite 100
Minneapolis, Minnesota 55401

The Contractor and the Subcontractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

AIA Document A201™–2007, General Conditions of the Contract for Construction, is adopted in this document by reference.

This document has been approved and endorsed by the Associated Specialty Contractors, Inc.

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ARTICLE 1 THE SUBCONTRACT DOCUMENTS

§ 1.1 The Subcontract Documents consist of (1) this Agreement and all exhibits; (2) the Prime Contract, consisting of the Agreement between the Owner and Contractor and the other Contract Documents enumerated therein; (3) Modifications issued subsequent to the execution of the Agreement between the Owner and Contractor, whether before or after the execution of this Agreement; (4) other documents listed in Article 16 of this Agreement; and (5) Modifications to this Subcontract issued after execution of this Agreement. These form the Subcontract, and are as fully a part of the Subcontract as if attached to this Agreement or repeated herein. The Subcontract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Subcontract Documents, other than Modifications issued subsequent to the execution of this Agreement, appears in Article 16.

§ 1.2 Except to the extent of a conflict with a specific term or condition contained in the Subcontract Documents, the General Conditions governing this Subcontract shall be the AIA Document A201™–2007, General Conditions of the Contract for Construction, as amended.

§ 1.3 The Subcontract may be amended or modified only by a Modification. The Subcontract Documents shall not be construed to create a contractual relationship of any kind (1) between the Architect and the Subcontractor, (2) between the Owner and the Subcontractor, or (3) between any persons or entities other than the Contractor and Subcontractor.

§ 1.4 The Contractor shall make available the Subcontract Documents to the Subcontractor prior to execution of this Agreement, and thereafter, upon request, but the Contractor may charge the Subcontractor for the reasonable cost of reproduction.

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ARTICLE 2 MUTUAL RIGHTS AND RESPONSIBILITIES

The Contractor and Subcontractor shall be mutually bound by the terms of this Agreement and, to the extent that the provisions of AIA Document A201–2007 apply to this Agreement pursuant to Section 1.2 and provisions of the Prime Contract apply to the Work of the Subcontractor, the Contractor shall assume toward the Subcontractor all obligations and responsibilities that the Owner, under such documents, assumes toward the Contractor, and the Subcontractor shall assume toward the Contractor all obligations and responsibilities which the Contractor, under such documents, assumes toward the Owner and the Architect. The Contractor shall have the benefit of all rights, remedies and redress against the Subcontractor that the Owner, under such documents, has against the Contractor, and the Subcontractor shall have the benefit of all rights, remedies and redress against the Contractor that the Contractor, under such documents, has against the Owner, insofar as applicable to this Subcontract. Where a provision of such documents is inconsistent with a provision of this Agreement, this Agreement shall govern.

ARTICLE 3 CONTRACTOR

§ 3.1 SERVICES PROVIDED BY THE CONTRACTOR

§ 3.1.1 The Contractor shall cooperate with the Subcontractor in scheduling and performing the Contractor's Work to avoid conflicts or interference in the Subcontractor's Work and shall expedite written responses to submittals made by the Subcontractor in accordance with Section 4.1 and Article 5. Promptly after execution of this Agreement, the Contractor shall provide the Subcontractor copies of the Contractor's construction schedule and schedule of submittals, together with such additional scheduling details as will enable the Subcontractor to plan and perform the Subcontractor's Work properly. The Contractor shall promptly notify the Subcontractor of subsequent changes in the construction and submittal schedules and additional scheduling details.

§ 3.1.2 The Contractor shall provide suitable areas for storage of the Subcontractor's materials and equipment during the course of the Work. Additional costs to the Subcontractor resulting from relocation of such storage areas at the direction of the Contractor, except as previously agreed upon, shall be reimbursed by the Contractor.

§ 3.1.3 Except as provided in Article 14, the Contractor's equipment will be available to the Subcontractor only at the Contractor's discretion and on mutually satisfactory terms.

§ 3.2 COMMUNICATIONS

§ 3.2.1 The Contractor shall promptly make available to the Subcontractor information, including information received from the Owner, that affects this Subcontract and that becomes available to the Contractor subsequent to execution of this Subcontract.

§ 3.2.2 The Contractor shall not give instructions or orders directly to the Subcontractor's employees or to the Subcontractor's Sub-subcontractors or material suppliers unless such persons are designated as authorized representatives of the Subcontractor.

§ 3.2.3 The Contractor shall permit the Subcontractor to request directly from the Architect information regarding the percentages of completion and the amount certified on account of Work done by the Subcontractor.

§ 3.2.4 If hazardous substances of a type of which an employer is required by law to notify its employees are being used on the site by the Contractor, a subcontractor or anyone directly or indirectly employed by them (other than the Subcontractor), the Contractor shall, prior to harmful exposure of the Subcontractor's employees to such substance, give written notice of the chemical composition thereof to the Subcontractor in sufficient detail and time to permit the Subcontractor's compliance with such laws.

§ 3.2.5 The Contractor shall furnish to the Subcontractor within 30 days after receipt of a written request, or earlier if so required by law, information necessary and relevant for the Subcontractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property, usually referred to as the site, on which the Project is located and the Owner's interest therein.

§ 3.2.6 If the Contractor asserts or defends a claim against the Owner that relates to the Work of the Subcontractor, the Contractor shall promptly make available to the Subcontractor all information relating to the portion of the claim that relates to the Work of the Subcontractor.

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§ 3.3 CLAIMS BY THE CONTRACTOR

§ 3.3.1 Damages for delay shall be assessed against the Subcontractor only to the extent caused by the Subcontractor or any person or entity for whose acts the Subcontractor may be liable, and in no case for delays or causes arising outside the scope of this Subcontract.

§ 3.3.2 The Contractor's claims for the costs of services or materials provided due to the Subcontractor's failure to execute the Work shall require

.1 written notice prior to the Contractor's providing services or materials, except in an emergency; and

.2 written compilations to the Subcontractor of services and materials provided by the Contractor and charges for such services and materials no later than the fifteenth day of the month following the Contractor's providing such services or materials.

§ 3.4 CONTRACTOR'S REMEDIES

§ 3.4.1 Should the Subcontractor at any time: 1) refuse or neglect to supply sufficient and properly skilled workers; 2) refuse or neglect to supply materials of the proper quality; 3) fail in any respect to prosecute the Work with promptness and diligence; 4) make a general assignment for the benefit of its creditors, have a receiver appointed to take over its affairs, or, in the opinion of the Contractor, become financially or legally incapable of completing the work; or 5) fail in the performance of any of the covenants contained herein; and fail to correct such default or neglect with diligence and promptness within three (3) days after written notice from the Contractor, then the Contractor may, by appropriate Modification, and without additional written notice or prejudice to any other remedy, either:

a) provide such labor, materials, or services or other Work as is required by this Subcontract and deduct the cost thereof from any money then due or thereafter to become due to the Subcontractor under this Subcontract; or

b) terminate the employment of the Subcontractor for the Work and enter upon the premises and take possession for the purpose of completing the Work included under this Subcontract, of all materials, tools, and appliances thereon, and to employ any other person or persons to finish the Work, and to provide the materials required under this Subcontract.

The Contractor shall be entitled to recover all of its expense under this paragraph including all labor, materials, services (whether by Contractor or others) and any other cost (including attorneys' fees) or damages incurred as a result of Subcontractor's default. If such expense exceeds the unpaid balance of the amount to be paid under this Subcontract, the Subcontractor shall pay the difference to the Contractor on demand. If this Subcontract is terminated, the Subcontractor shall not be entitled to receive any further payment under this Subcontract until the Work is complete.

§ 3.4.2 If at any time there shall be evidence of any invoice, bill, lien or claim arising from Subcontractor's operations under this Subcontract or any other agreement between the parties (Claim) for which the Contractor, the Owner, a surety, or any property, might be or become liable or subject to, then the Contractor shall have the right to retain out of any payment then due or thereafter to become due the Subcontractor, an amount sufficient to discharge such Claim and reimburse the Contractor, Owner, and surety for all costs and expenses (including attorneys' fees) in connection with such Claim. If the Subcontractor has failed to resolve a Claim or provide a bond to protect the Owner, the Contractor and any surety against such Claim within thirty (30) days after written notice, the Contractor, the Owner or a surety shall have the right to make payment on such Claim out of funds due or to become due the Subcontractor. If no such funds are available, the Subcontractor shall indemnify the Contractor, the Owner and surety for all amounts any of them have in good faith paid in discharging any Claim, including any associated costs and expenses (including attorneys' fees).

ARTICLE 4 SUBCONTRACTOR

§ 4.1 EXECUTION AND PROGRESS OF THE WORK

§ 4.1.1 For all Work the Subcontractor intends to subcontract, the Subcontractor shall enter into written agreements with Sub-subcontractors performing portions of the Work of this Subcontract by which the Subcontractor and the Sub-subcontractor are mutually bound, to the extent of the Work to be performed by the Sub-subcontractor, assuming toward each other all obligations and responsibilities that the Contractor and Subcontractor assume toward each other

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and having the benefit of all rights, remedies and redress each against the other that the Contractor and Subcontractor have by virtue of the provisions of this Agreement.

§ 4.1.2 The Subcontractor shall supervise and direct the Subcontractor's Work, and shall cooperate with the Contractor in scheduling and performing the Subcontractor's Work to avoid conflict, delay in or interference with the Work of the Contractor, other subcontractors, the Owner, or separate contractors.

§ 4.1.3 The Subcontractor shall promptly submit Shop Drawings, Product Data, Samples and similar submittals required by the Subcontract Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Contractor or other subcontractors.

§ 4.1.4 The Subcontractor shall furnish to the Contractor periodic progress reports on the Work of this Subcontract as mutually agreed, including information on the status of materials and equipment that may be in the course of preparation, manufacture, or transit.

§ 4.1.5 The Subcontractor agrees that the Contractor and the Architect each have the authority to reject Work of the Subcontractor that does not conform to the Prime Contract. The Architect's decisions on matters relating to aesthetic effect shall be final and binding on the Subcontractor if consistent with the intent expressed in the Prime Contract.

§ 4.1.6 The Subcontractor shall pay for all materials and equipment used in connection with the performance of this Subcontract through the period covered by previous payments received from the Contractor or in accordance with the terms of such purchase agreements entered into by the Subcontractor, whichever is earlier, and shall pay for labor as incurred, and shall furnish satisfactory evidence, when requested by the Contractor, to verify compliance with the above requirements.

§ 4.1.7 The Subcontractor shall take necessary precautions to protect properly the work of other subcontractors from damage caused by operations under this Subcontract.

§ 4.1.8 The Subcontractor shall cooperate with the Contractor, other subcontractors, the Owner, and separate contractors whose work might interfere with the Subcontractor's Work. The Subcontractor shall participate in the preparation of coordinated drawings in areas of congestion, if required by the Prime Contract, specifically noting and advising the Contractor of potential conflicts between the Work of the Subcontractor and that of the Contractor, other subcontractors, the Owner, or separate contractors.

§ 4.1.9 The Subcontractor shall have a continuing duty to provide a list of subcontractors and suppliers.

§ 4.1.10 The Subcontractor recognizes that revisions in the planned schedule are inherent in the nature of construction. This may result in revisions to Contractor's schedule of the Work during the progress of construction. Subcontractor agrees that Contractor cannot guarantee Subcontractor will be able to start Work on any particular date or continue without interruption once started. Contractor will only be responsible for conditions within its control which cause Subcontractor unreasonable delay in the performance of its Work, provided Subcontractor give immediate written notice of the delay to Contractor.

§ 4.2 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

§ 4.2.1 The Subcontractor shall give notices and comply with applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on performance of the Work of this Subcontract. The Subcontractor shall secure and pay for permits, fees, licenses and inspections by government agencies necessary for proper execution and completion of the Subcontractor's Work, the furnishing of which is required of the Contractor by the Prime Contract. Subcontractor warrants and represents to Contractor that it has, and will maintain, required licenses in the jurisdiction of the Project.

§ 4.2.2 The Subcontractor shall comply with Federal, state and local tax laws, social security acts, unemployment compensation acts and workers' compensation acts insofar as applicable to the performance of this Subcontract.

§ 4.3 SAFETY PRECAUTIONS AND PROCEDURES

§ 4.3.1 The Subcontractor shall take reasonable safety precautions with respect to performance of this Subcontract, shall comply with safety measures initiated by the Contractor, including Contractor's Safety and Health Program that

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can be **found** at www.jedunn.com/spq/safetyprogram/, which is incorporated in this Agreement by this reference, and with applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities for the safety of persons and property in accordance with the requirements of the Prime Contract. If required, Subcontractor shall prepare a written site-specific safety plan for the Project prior to commencing the Work. The Subcontractor shall report to the Contractor within three days an injury to an employee or agent of the Subcontractor which occurred at the site.

§ 4.3.2 If hazardous substances of a type of which an employer is required by law to notify its employees are being used on the site by the Subcontractor, the Subcontractor's Sub-subcontractors or anyone directly or indirectly employed by them, the Subcontractor shall, prior to harmful exposure of any employees on the site to such substance, give written notice of the chemical composition thereof to the Contractor in sufficient detail and time to permit compliance with such laws by the Contractor, other subcontractors and other employers on the site.

§ 4.3.3 If reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a hazardous material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Subcontractor, the Subcontractor shall, upon recognizing the condition, immediately stop Work in the affected area and promptly report the condition to the Contractor in writing. When the material or substance has been rendered harmless, the Subcontractor's Work in the affected area shall resume upon written agreement of the Contractor and Subcontractor. The Subcontract Time shall be extended appropriately and the Subcontract Sum shall be increased in the amount of the Subcontractor's reasonable additional costs of demobilization, delay and remobilization, which adjustments shall be accomplished as provided in Article 5 of this Agreement.

§ 4.3.4 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Subcontractor, the Subcontractor's Sub-subcontractors, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 4.3.3 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity. Provided, however, Contractor's obligation under this provision is limited to the extent the Contractor is indemnified by the Owner for such claims, damages, losses or expenses of the Subcontractor, the Subcontractor's Sub-subcontractors, or their agents or employees.

§ 4.3.5 The Subcontractor shall indemnify the Contractor for the cost and expense the Contractor incurs 1) for remediation of a material or substance brought to the site and negligently handled by the Subcontractor or 2) where the Subcontractor fails to perform its obligations under Section 4.3.3, except to the extent that the cost and expense are due to the Contractor's fault or negligence.

§ 4.3.6 The Subcontractor shall have a supervisor capable of communicating in English on site at all times during its Work.

§ 4.4 CLEANING UP

§ 4.4.1 The Subcontractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations performed under this Subcontract. The Subcontractor shall not be held responsible for conditions caused by other contractors or subcontractors.

§ 4.4.2 As provided under Section 3.3.2, if the Subcontractor fails to clean up as provided in the Subcontract Documents, the Contractor may charge the Subcontractor for the Subcontractor's appropriate share of cleanup costs.

§ 4.5 WARRANTY

The Subcontractor warrants to the Owner, Architect, and Contractor that materials and equipment furnished under this Subcontract will be of good quality and new unless the Subcontract Documents require or permit otherwise. The Subcontractor further warrants that the Work will conform to the requirements of the Subcontract Documents and will be free from defects, except for those inherent in the quality of the Work the Subcontract Documents require or permit. Work, materials, or equipment not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Subcontractor's warranty excludes remedy for damage or defect

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caused by abuse, alterations to the Work not executed by the Subcontractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the Architect and Contractor, the Subcontractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. This warranty shall be in addition to and not in limitation of any other warranty or remedy required by law or by the Subcontract Documents.

§ 4.6 INDEMNIFICATION

§ 4.6.1 To the fullest extent permitted by law, the Subcontractor shall defend, indemnify and hold harmless the Owner, Contractor, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from performance of the Subcontractor's Work under this Subcontract, but only to the extent caused by the negligent acts or omissions of the Subcontractor, the Subcontractor's Sub-subcontractors, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or otherwise reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 4.6.

§ 4.6.2 In claims against any person or entity indemnified under this Section 4.6 by an employee of the Subcontractor, the Subcontractor's Sub-subcontractors, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 4.6.1 shall not be limited by a limitation on the amount or type of damages, compensation or benefits payable by or for the Subcontractor or the Subcontractor's Sub-subcontractors under workers' compensation acts, disability benefit acts or other employee benefit acts.

§ 4.7 REMEDIES FOR NONPAYMENT

§ 4.7.1 If the Contractor does not pay the Subcontractor through no fault of the Subcontractor, within seven (7) days from the time payment should be made as provided in this Agreement, the Subcontractor may, without prejudice to any other available remedies, upon seven (7) additional days' written notice to the Contractor, stop the Work of this Subcontract until payment of the amount owing has been received. The Subcontract Sum shall, by appropriate Modification, be increased by the amount of the Subcontractor's reasonable costs of demobilization, delay and remobilization.

§ 4.7.2 Unless otherwise provided, all materials shipped to the job site in performance of this Subcontract shall be shipped F.O.B. jobsite. In the event of claims by carriers against Contractor for shipping costs, Contractor shall be entitled to pay such claims and deduct the amount of the claims from the Subcontract Sum.

ARTICLE 5 CHANGES IN THE WORK

§ 5.1 The Owner may make changes in the Work by issuing Modifications to the Prime Contract. Upon receipt of such a Modification issued subsequent to the execution of the Subcontract Agreement, the Contractor shall promptly notify the Subcontractor of the Modification. Unless otherwise directed by the Contractor, the Subcontractor shall not thereafter order materials or perform Work that would be inconsistent with the changes made by the Modification to the Prime Contract.

§ 5.2 The Subcontractor may be ordered in writing by the Contractor, without invalidating this Subcontract, to make changes in the Work within the general scope of this Subcontract consisting of additions, deletions or other revisions, including those required by Modifications to the Prime Contract issued subsequent to the execution of this Agreement, the Subcontract Sum and the Subcontract Time being adjusted accordingly. The Subcontractor, prior to the commencement of such changed or revised Work, shall submit promptly to the Contractor written copies of a claim for adjustment to the Subcontract Sum and Subcontract Time for such revised Work in a manner consistent with requirements of the Subcontract Documents.

§ 5.3 The Subcontractor shall make all claims promptly to the Contractor for additional cost, extensions of time and damages for delays or other causes in accordance with the Subcontract Documents. A claim which will affect or become part of a claim which the Contractor is required to make under the Prime Contract within a specified time period or in a specified manner shall be made in sufficient time to permit the Contractor to satisfy the requirements of the Prime Contract. Such claims shall be received by the Contractor not less than two working days preceding the time

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by which the Contractor's claim must be made. Failure of the Subcontractor to make such a timely claim shall bind the Subcontractor to the same consequences as those to which the Contractor is bound.

ARTICLE 6 MEDIATION AND BINDING DISPUTE RESOLUTION

§ 6.1 MEDIATION

§ 6.1.1 Any claim arising out of or related to this Subcontract, except those waived in this Subcontract, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 6.1.2 The parties shall endeavor to resolve their claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to this Subcontract and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section, the parties may nonetheless proceed to the selection of the arbitrators(s) and agree upon a schedule for later proceedings.

§ 6.1.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 6.2 BINDING DISPUTE RESOLUTION

For any claim subject to, but not resolved by mediation pursuant to Section 6.1, the method of binding dispute resolution shall be as follows:
(Check the appropriate box. If the Contractor and Subcontractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, claims will be resolved by litigation in a court of competent jurisdiction.)

[ ] Arbitration pursuant to Section 6.3 of this Agreement

[ ] Litigation in a court of competent jurisdiction

[X] Other: *See Section 6.4 of this Agreement*

§ 6.3 Not Used

(Paragraphs deleted)

§ 6.4 DISPUTES NOT RESOLVED BY MEDIATION

§ 6.4.1 Subcontractor shall be bound by all decisions, interpretations, findings of fact or law, whether express, implied, interim, or final (Decisions) arising out of the claim and dispute resolution processes set forth in the Prime Contract to the extent: 1) such Decisions relate to or affect the work or services subcontracted to Subcontractor; or 2) any claim by Owner against Contractor involves the performance of Subcontractor; or 3) any claim of Subcontractor gives rise to a claim by Contractor against Owner. The initiation of claim or dispute resolution under the Prime Contract shall stay dispute resolution under this Subcontract on any claim or issue brought by Subcontractor related to the dispute under the Prime Contract.

§ 6.4.2 To the extent Subcontractor will be bound as set forth above, Contractor consents to Subcontractor's participation (and joinder if requested) in such claim or dispute resolution process, and Subcontractor may appeal (in the event Subcontractor has been joined as a party), or request Contractor to appeal, any Decision pursuant to the claim or dispute resolution procedure of the Prime Contract. Subcontractor and Contractor shall individually bear the costs associated with their own claims in such appeal. A party will follow the other party's directions regarding the other party's claims, unless such directions adversely affect the party's own claims. In that event the parties will agree on how to proceed. Each party will give the other party reasonable assistance.

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§ 6.4.3 Subcontractor consents to joinder in any dispute or claim resolution process under the Prime Contract, including arbitration. This agreement to arbitrate and agreement to arbitrate with another person or persons, if applicable, shall be specifically enforceable under applicable law in any court having jurisdiction.

§ 6.4.4 Any claim or dispute not involving the Prime Contract or waived in this Subcontract shall be subject to arbitration unless the parties agree otherwise. Prior to arbitration, the parties shall endeavor to resolve claims and disputes by mediation.

§ 6.4.5 In the event of arbitration, the award rendered by arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction.

§ 6.4.6 Unless otherwise agreed in writing, the Subcontractor shall maintain its progress during any dispute proceeding.

§ 6.4.7 The provisions of this Article supersede provisions of the General Conditions or other Subcontract terms, if any, to the contrary.

§ 6.4.8 This Article shall survive completion or termination of the Subcontract.

ARTICLE 7 TERMINATION, SUSPENSION OR ASSIGNMENT OF THE SUBCONTRACT

§ 7.1 TERMINATION BY THE SUBCONTRACTOR

The Subcontractor may terminate the Subcontract for the same reasons and under the same circumstances and procedures with respect to the Contractor as the Contractor may terminate with respect to the Owner under the Prime Contract, or for nonpayment of amounts due under this Subcontract for 60 days or longer. In the event of such termination by the Subcontractor for any reason which is not the fault of the Subcontractor, Sub-subcontractors or their agents or employees or other persons performing portions of the Work under contract with the Subcontractor, the Subcontractor shall be entitled to recover from the Contractor payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead, profit and damages.

§ 7.2 TERMINATION BY THE CONTRACTOR

§ 7.2.1 Refer to Subparagraph 3.4.1 for Contractor's remedies upon default of Subcontractor, including termination for cause. In addition to the Contractor's rights under Subparagraph 3.4.1, Contractor shall have the right to terminate this Subcontract for convenience.

§ 7.2.2 If the Owner terminates the Contract for the Owner's convenience, the Contractor shall promptly deliver written notice to the Subcontractor.

§ 7.2.3 Upon receipt of written notice of termination for convenience, the Subcontractor shall

- **.1** cease operations as directed by the Contractor in the notice;
- **.2** take actions necessary, or that the Contractor may direct, for the protection and preservation of the Work; and
- **.3** except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing Sub-subcontracts and purchase orders and enter into no further Sub-subcontracts and purchase orders.

§ 7.2.4 In case of such termination for the Owner's or Contractor's convenience, the Subcontractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed to the extent such costs, overhead and profit are recovered from the Owner.

§ 7.2.5 If it is determined for any reason that Subcontractor was not in default, or that default was excusable, then the rights and the obligations of the parties will be the same as if the notice of termination had been issued pursuant to a termination for convenience.

§ 7.3 SUSPENSION BY THE CONTRACTOR FOR CONVENIENCE

§ 7.3.1 The Contractor may, without cause, order the Subcontractor in writing to suspend the Work of this Subcontract in whole or in part for such period of time as the Contractor may determine. In the event of suspension ordered by the

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Contractor, the Subcontractor shall be entitled to an equitable adjustment of the Subcontract Time and Subcontract Sum.

§ 7.3.2 An adjustment shall be made for increases in the Subcontract Time and Subcontract Sum, including profit on the increased cost of performance, caused by suspension. No adjustment shall be made to the extent that

.1 performance is, was or would have been so suspended by another cause for which the Subcontractor is responsible; or

.2 an equitable adjustment is made or denied under another provision of this Subcontract.

§ 7.4 ASSIGNMENT OF THE SUBCONTRACT

§ 7.4.1 In the event the Owner terminates the Prime Contract for cause, this Subcontract is assigned to the Owner pursuant to Section 5.4 of A201–2007 provided the Owner accepts the assignment.

§ 7.4.2 Without the Contractor's written consent, the Subcontractor shall not assign the Work of this Subcontract, subcontract the whole of this Subcontract, or subcontract portions of this Subcontract. All Sub-subcontracts or Purchase Orders shall allow assignment to the Owner or Contractor in the event of termination for cause.

§ 7.4.3 The Subcontractor shall not assign any of the funds to be received under or through this Subcontract unless such Assignment has the written approval of the Contractor. In order to be so approved, any such assignment shall include the following language: "It is agreed the funds to be paid to the Assignee under this Assignment are subject to satisfactory performance of the subcontract under which this Assignment is made ("this Subcontract") by the Assignor ("the Subcontractor") and subject to payment of all invoices, bills, claims, or liens for services rendered or materials supplied for the performance of any portion of the Work called for in this Subcontract with Contractor or any other subcontract between Contractor and Subcontractor. Contractor reserves the right to set-off against any funds which may be due Subcontractor by Contractor or funds to be paid the Assignee the amount of any claim or liens arising under or through this or any other subcontract with the Subcontractor."

ARTICLE 8 THE WORK OF THIS SUBCONTRACT

The Subcontractor shall execute the following portion of the Work described in the Subcontract Documents, including all labor, materials, equipment, services and other items required to complete such portion of the Work, except to the extent specifically indicated in the Subcontract Documents to be the responsibility of others.

See Exhibit B.

ARTICLE 9 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 9.1 Subcontract Time is the period of time, including authorized adjustments, allotted in the Subcontract Documents for Substantial Completion of the Work described in the Subcontract Documents. The

(Paragraphs deleted)

Work of this Subcontract shall be commenced and completed pursuant to the schedule of construction developed by the Contractor as may be amended from time to time.

§ 9.2 Unless the date of commencement is established by a notice to proceed issued by the Contractor, or the Contractor has commenced visible Work at the site under the Prime Contract, the Subcontractor shall notify the Contractor in writing not less than five days before commencing the Subcontractor's Work to permit the timely filing of mortgages, mechanic's liens and other security interests.

§ 9.3 The Work of this Subcontract shall be substantially completed not later than

(Paragraphs deleted)

as required by the Subcontract Documents, subject to adjustments of this Subcontract Time as provided in the Subcontract Documents .

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§ 9.4 With respect to the obligations of both the Contractor and the Subcontractor, time is of the essence of this Subcontract.

§ 9.5 No extension of time will be valid without the Contractor's written consent after claim made by the Subcontractor in accordance with Section 5.3.

ARTICLE 10 SUBCONTRACT SUM

§ 10.1 The Contractor shall pay the Subcontractor in current funds for performance of the Subcontract the Subcontract Sum set forth in Exhibit B which includes all applicable taxes, subject to additions and deductions as provided in the Subcontract Documents.

§ 10.2 The Subcontract Sum is based upon the alternates, if any, which are described in the Subcontract Documents and have been accepted by the Owner and the Contractor as identified in Exhibit B.

§ 10.3 Unit prices, if any, are listed in Exhibit B.

§ 10.4 Allowances included in the Subcontract Sum, if any, are listed in Exhibit B.

§ 10.5 A request for payment for a change in the Work will not be honored unless such change in the Work was authorized in writing by Contractor.

ARTICLE 11 PROGRESS PAYMENTS

§ 11.1 Based upon applications for payment submitted to the Contractor by the Subcontractor, corresponding to applications for payment submitted by the Contractor to the Architect, and certificates for payment issued by the Architect, the Contractor shall make progress payments on account of the Subcontract Sum to the Subcontractor as provided below and elsewhere in the Subcontract Documents. Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor and Subcontractor for Work properly performed by their contractors and suppliers shall be held by the Contractor and Subcontractor for those contractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor or Subcontractor for which payment was made to the Contractor by the Owner or to the Subcontractor by the Contractor, as applicable. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor or Subcontractor, shall create any fiduciary liability or tort liability on the part of the Contractor or Subcontractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor or Subcontractor for breach of the requirements of this provision.

§ 11.1.1 As a condition of payment, Subcontractor shall furnish lien waivers and affidavits with each pay application for itself and its subcontractors and suppliers in a form acceptable to Contractor.

§ 11.2 The period covered by each application for payment shall be one calendar month ending on the last day of the month, or as follows:

§ 11.3 Provided an application for payment is received by the Contractor not later than the twenty-fifth day of a month, the Contractor shall include the Subcontractor's Work covered by that application in the next application for payment which the Contractor is entitled to submit to the Architect. The Contractor shall pay the Subcontractor each progress payment no later than five (5) working days after the Contractor receives payment from the Owner.

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§ 11.4 If the Subcontractor's application for payment is received by the Contractor after the application date fixed above, the Subcontractor's Work covered by it shall be included by the Contractor in the next application for payment submitted to the Architect.

§ 11.5 The Subcontractor shall submit to the Contractor a schedule of values prior to submitting the Subcontractor's first Application for Payment. Each subsequent application for payment shall be based upon the most recent schedule of values submitted by the Subcontractor in accordance with the Subcontract Documents. The schedule of values shall allocate the entire Subcontract Sum among the various portions of the Subcontractor's Work and be prepared in such form and supported by such data to substantiate its accuracy as the Contractor may require. This schedule, unless objected to by the Contractor, shall be used as a basis for reviewing the Subcontractor's applications for payment.

§ 11.6 Applications for payment submitted by the Subcontractor shall indicate the percentage of completion of each portion of the Subcontractor's Work as of the end of the period covered by the application for payment.

§ 11.7 Subject to the provisions of the Subcontract Documents, the amount of each progress payment shall be computed as set forth in the sections below.

§ 11.7.1 Take that portion of the Subcontract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Subcontractor's Work by the share of the total Subcontract Sum allocated to that portion of the Subcontractor's Work in the schedule of values, less the retainage indicated below. Pending final determination of cost to the Contractor of changes in the Work that have been properly authorized by the Contractor, amounts not in dispute shall be included to the same extent provided in the Prime Contract, even though the Subcontract Sum has not yet been adjusted;

§ 11.7.1.1 Five percent (5%) retainage shall be withheld from each progress payment until the completion of the Project.

§ 11.7.2 To the extent provided in the Prime Contract, add that portion of the Subcontract Sum properly allocable to materials and equipment delivered and suitably stored at the site by the Subcontractor for subsequent incorporation in the Subcontractor's Work or, if approved by the Contractor, suitably stored off the site at a location agreed upon in writing, less the same percentage retainage required by the Prime Contract to be applied to such materials and equipment in the Contractor's application for payment;

§ 11.7.3 Subtract the aggregate of previous payments made by the Contractor; and

§ 11.7.4 Subtract amounts, if any, calculated under Section 11.7.1 or 11.7.2 that are related to Work of the Subcontractor for which the Architect has withheld or nullified, in whole or in part, a certificate of payment for a cause that is the fault of the Subcontractor.

§ 11.8 Upon the partial or entire disapproval by the Contractor of the Subcontractor's application for payment, the Contractor shall provide written notice to the Subcontractor. When the basis for the disapproval has been remedied, and the Contractor has received payment from the Owner, the Subcontractor shall be paid the amounts withheld.

§ 11.9 SUBSTANTIAL COMPLETION

When the Subcontractor's Work or a designated portion thereof is substantially complete and in accordance with the requirements of the Prime Contract, the Contractor shall, upon application by the Subcontractor, make prompt application for payment for such Work. Within 30 days following issuance by the Architect of the certificate for payment covering such substantially completed Work, the Contractor shall, to the full extent allowed in the Prime Contract, make payment to the Subcontractor, deducting any portion of the funds for the Subcontractor's Work withheld in accordance with the certificate to cover costs of items to be completed or corrected by the Subcontractor. Such payment to the Subcontractor shall be the entire unpaid balance of the Subcontract Sum if a full release of retainage is allowed under the Prime Contract for the Subcontractor's Work prior to the completion of the entire Project. If the Prime Contract does not allow for a full release of retainage, then such payment shall be an amount which, when added to previous payments to the Subcontractor, will reduce the retainage on the Subcontractor's substantially completed Work to the same percentage of retainage as that on the Contractor's Work covered by the certificate.

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ARTICLE 12 FINAL PAYMENT

§ 12.1 Final payment, constituting the entire unpaid balance of the Subcontract Sum, shall be made by the Contractor to the Subcontractor when the Subcontractor's Work is fully performed in accordance with the requirements of the Subcontract Documents, the Architect has issued a certificate for payment covering the Subcontractor's completed Work and the Contractor has received payment from the Owner.

§ 12.2 Before issuance of the final payment, the Subcontractor, if required, shall submit evidence satisfactory to the Contractor that all payrolls, bills for materials and equipment, and all known indebtedness connected with the Subcontractor's Work have been satisfied. Acceptance of final payment by the Subcontractor shall constitute a waiver of claims by the Subcontractor, except those previously made in writing and identified by the Subcontractor as unsettled at the time of final application for payment.

ARTICLE 13 INSURANCE AND BONDS

CONTROLLED INSURANCE PROGRAM – GENERAL LIABILITY AND WORKERS COMPENSATION

§ 13.1 The Contractor has elected to provide General Liability insurance and Workers Compensation insurance through a Controlled Insurance Program (CIP) for Contractor and enrolled subcontractors. The Subcontract Sum includes the cost of providing and maintaining the specific insurance coverage required by the Controlled Insurance Program Requirements and Forms manual (CIP Manual). The Subcontract Sum specifically excludes costs of onsite General Liability coverage for enrolled subcontractors. The Subcontract Sum of enrolled Subcontractors and their enrolled lower tier subcontractors shall be reduced by their cost of Workers Compensation insurance, in accordance with the CIP Manual.

(Table deleted)

§ 13.2 The Subcontractor shall comply, and shall require its lower tier subcontractors to comply, with all requirements in the CIP Manual for enrolled or non-enrolled subcontractors, as applicable. The following parties are required to be named as additional insureds on liability policies required to be provided by Subcontractor and its lower tier subcontractors:

Owner – State of Minnesota
Contractor – JE Dunn Construction Company
Architect – Hammel, Green, Abrahamson (HGA), Inc.

§ 13.3 The Subcontractor shall ensure that its lower tier subcontractors include the cost of providing and maintaining the specific insurance coverage required by the CIP Manual, but exclude costs of onsite General Liability coverage for enrolled subcontractors.

§ 13.4 The Contractor shall furnish to the Subcontractor satisfactory evidence of insurance required of the Contractor under the Prime Contract.

§ 13.5 The Contractor shall promptly, upon request of the Subcontractor, furnish a copy or permit a copy to be made of any bond covering payment of obligations arising under the Subcontract.

§ 13.6 Performance Bond and Payment Bond:

The Contractor shall have the right to require the Subcontractor to furnish bonds providing for the faithful performance of the Subcontract and the payment of all obligations arising thereunder. The cost of such bonds, if required by the Contractor, shall be paid by an adjustment to the Subcontract Sum via change order unless the cost is specifically included in the Subcontract Sum. Bonds shall be issued by a surety company that is rated "A-" or better by A.M. Best Company, has a per bond underwriting limit set forth in the most current United States Treasury Department Circular 570 List that is greater than or equal to the face value of the bond, and shall be on forms satisfactory to the Contractor.

§ 13.7 PROPERTY INSURANCE

(Paragraph deleted)

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Subcontractor shall provide insurance for its tools and equipment at its own cost and shall waive all rights against Owner, Contractor, Architect and other subcontractors of any tier for damages or losses to such tools and equipment, however caused.
(Table deleted)
(Paragraphs deleted)

§ 13.9 WAIVERS OF SUBROGATION

The Contractor and Subcontractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Owner, the Architect, the Architect's consultants, separate contractors, and any of their subcontractors, sub-subcontractors, agents and employees for damages caused by fire or other causes of loss to the extent covered by property insurance provided under the Prime Contract or other property insurance applicable to the Work, to the extent such subrogation rights are waived under the terms of the Prime Contract, except such rights as they may have to proceeds of such insurance held by the Owner as a fiduciary. The Subcontractor shall require of the Subcontractor's Sub-subcontractors, agents and employees, by appropriate agreements, written where legally required for validity, similar waivers in favor of the parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged. Subcontractor shall be responsible for payment of the deductible, if any, in the event of an insured loss arising out of Subcontractor's Work.

ARTICLE 14 TEMPORARY FACILITIES AND WORKING CONDITIONS

§ 14.1 The Contractor shall furnish and make available at no cost to the Subcontractor the Contractor's temporary facilities, equipment and services as required in the Subcontract Documents.

§ 14.2 Specific working conditions:
(Insert any applicable arrangements concerning working conditions and labor matters for the Project.)

§ 14.2.1 The Subcontractor hereby acknowledges that the Contractor may be a party to certain collective bargaining agreements with various union crafts, which agreements may affect the work of subcontractors, including Subcontractor, while working on this Project. The Subcontractor agrees that, to the extent any such agreement is applicable to Work performed by the Subcontractor, the Subcontractor shall take all steps necessary to comply with the Subcontractor articles or other applicable provisions of the Contractor's collective bargaining agreements. If any portion of the Subcontractor's Work is further subcontracted, the Subcontractor shall require its lower tier subcontractors to be bound by and observe all terms and provisions of such collective bargaining agreements to the same extent as is hereby required of the Subcontractor.

§ 14.2.2 The Subcontractor agrees that in the event of any strike, picket, sympathy strike, work stoppage or other form of labor dispute or picket in connection with the work of the Contractor, the Subcontractor, the Owner, or any other subcontractor or person, the Subcontractor will, contingent upon Contractor providing a picket free entrance, continue to perform the Work required herein without interruption or delay. Contractor shall have no obligation to provide a picket free entrance should such labor activity be directed at the Subcontractor. In the event the Subcontractor fails to continue performance of the Work without interruption or delay, because of such picket or other form of labor dispute, the Contractor may terminate the Subcontract after giving 48 hours written notice, or the Contractor may invoke any of the rights set forth elsewhere in this Subcontract.

§ 14.2.3 Project work hours shall be 7:30 AM to 4:00 PM unless modified by Contractor.

ARTICLE 15 MISCELLANEOUS PROVISIONS

§ 15.1 Where reference is made in this Subcontract to a provision of another Subcontract Document, the reference refers to that provision as amended or supplemented by other provisions of the Subcontract Documents.

§ 15.2 Registration Requirements. Minn. Stat § 181.723 as amended (Minn. Laws, chapter 295) requires Contractors and Subcontractors that provide commercial or residential building construction or improvement services

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in Minnesota to be registered with the Minnesota Department of Labor and Industry (DLI) by September 15, 2012, unless they are already licensed, certified or registered by the Minnesota Department of Labor and Industry.

.a Building construction contractors, including independent contractors, subcontractors, and business entities providing public or private sector commercial or residential building construction or improvement services are required to be registered with the Department of Labor and Industry.

.b The registration requirement does not apply to workers and businesses that are already licensed, registered or certified with DLI, nor does it apply to employees.

.c No fee will be charged for initial registration.

.d Registration shall be done online and requires information about the business and its owners and officers. This information is critical to enforcement activities of DLI, DEED, and Revenue and is the same information currently required for licensed residential building contractors, electrical contractors, and plumbing contractors.

.e General or Prime Contractors will be able to verify that subcontractors are registered on the searchable Department of Labor and Industry Contractor Look-Up web site.

.f The law provides for penalties for failure to register, hiring unregistered contractors, misclassifying employees and coercing others to form a business entity. The penalty for failing to register will be forgiven if registration is achieved within 30 days, during the pilot project.

.g The Building Construction Contractor Registration replaces the Independent Contractor Exemption Certificate program (ICEC).

.h For additional information and to register go to www.dli.mn.gov/register or contact DLI at 651.284.5074 or email: dli.register@state.mn.us.

§ 15.3 All labor and tradework performed under this contract is subject to the State's Prevailing Wage Laws. Subcontractors performing construction work on the project are required to comply with Prevailing Wage requirements in Minnesota Statute §177.43. All subcontractor(s) shall furnish, via E-mail, an Excel Prevailing Wage Payroll Information Form to E-mail address: RECS.PrevailingWageForm@state.mn.us . The Excel Prevailing Wage Payroll Information Form is available on the following website: www.mmd.admin.state.mn.us/mn02000.htm. The Subject line on the E-mail must give the Firm Name and the Contract Number. This Excel form must be furnished not more than 14 days after the end of each pay period. The major subcontracting companies shall also post, at the job site, the prevailing wage rates for the county where the project is located. The Prevailing Wage Rates for all Minnesota counties are located at the Minnesota Department of Labor and Industry's website: http://www.dli.mn.gov/LS/PrevWage.asp.

§ 15.4 Goals for the use and participation of Targeted Group Business (TGB) have been established for the Project. These goals are set forth in the Project Manual. Subcontractor agrees to employ good faith efforts to accomplish the TGB goals and maximize the opportunity for TGB participation in the performance of the Work as lower tier subcontractors and suppliers, through direct subcontract or as part of a second tier or joint venture agreement with majority owned subcontractors. Subcontractor shall keep and maintain, and shall provide access to appropriate records tracking and verifying the actual TGB participation achieved by Subcontractor in connection with the Work.

§ 15.5 Separate, individual goals have been established for the use and participation of minorities and females in the workforce on the Project as follows: thirty two percent (32%) minority; and six percent (6%) female (collectively the "Workforce Goals"). Subcontractor agrees to employ good faith efforts to accomplish the Workforce Goals and maximize the opportunity for minority and female participation in the performance of the Work and shall require its lower tier subcontractors to make similar efforts. Subcontractor shall keep and maintain, and shall provide access to appropriate records tracking and verifying the actual participation achieved by Subcontractor and its lower tier subcontractors in connection with the Work.

§ 15.4 The Contractor and Subcontractor waive claims against each other for consequential damages arising out of or relating to this Subcontract, including without limitation, any consequential damages due to either party's termination in accordance with Article 7.

§ 15.5 The Subcontractor agrees to comply with the provisions of any applicable local, state, or federal ordinance, regulation, statute, or other mandate regarding affirmative action and/or minority/women's business enterprise participation.

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§ 15.6 The risk of loss for materials and equipment provided under this Subcontract, whether in a deliverable state or otherwise, shall remain with the Subcontractor until delivered to the job site and incorporated into the Work. Any damage to the material and equipment or loss of any kind occasioned in transit shall be borne by the Subcontractor, notwithstanding the manner in which the material or equipment is shipped or who pays the freight or other transportation costs.

ARTICLE 16 ENUMERATION OF SUBCONTRACT DOCUMENTS

§ 16.1 The Subcontract Documents, except for Modifications issued after execution of this Subcontract, are enumerated in the sections below.

§ 16.1.1 This executed AIA Document A401–2007, Standard Form of Agreement Between Contractor and Subcontractor, as modified.

§ 16.1.2 The Prime Contract, consisting of the Agreement between the Owner and Contractor dated as first entered above and the other Contract Documents enumerated in the Owner-Contractor Agreement.

§ 16.1.3 The following Modifications to the Prime Contract, if any, issued subsequent to the execution of the Owner-Contractor Agreement but prior to the execution of this Agreement:

Modification	Date

§ 16.1.4 Additional Documents, if any, forming part of the Subcontract Documents:

.1 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

.2 Other documents:
(List here any additional documents that are intended to form part of the Subcontract Documents. Requests for proposal and the Subcontractor's bid or proposal should be listed here only if intended to be made part of the Subcontract Documents.)

See Exhibit A.

LIST OF EXHIBITS
Exhibit A – Subcontract Documents
Exhibit B – Scope of Work and Subcontract Sum

THIS AGREEMENT CONTAINS A BINDING ARBITRATION PROVISION WHICH MAY BE ENFORCED BY THE PARTIES.

This Agreement entered into as of the day and year first written above.
J.E. DUNN CONSTRUCTION COMPANY

CONTRACTOR *(Signature)*	**SUBCONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*
Contractor License Number _____	Contractor License Number _____

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SECTION 00 52 01
MATERIAL and EQUIPMENT AGREEMENT

The M&E Agreement may be modified from the form included to reflect project-specific provisions required by the Owner. Otherwise, the M&E Agreement shall not be changed from the form that is included. The Bidder shall include in its Bid all costs associated with executing the M&E Agreement unconditionally and as provided in this Section.

MATERIAL AND EQUIPMENT CONTRACT

AGREEMENT

made this day of in the year Two-Thousand ____

BETWEEN the Contractor: J. E. Dunn Construction Company
1001 Locust
Kansas City, Missouri 64106

and the Supplier:

Project:

Owner:

Architect:

The Contractor and Supplier agree as set forth below.

ARTICLE I The Contract Documents for this Contract consist of this Agreement and any Exhibits attached hereto, the Agreement between the Owner and Contractor dated _____, the Conditions of the Contract between the Owner and Contractor (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda issued prior to execution of the Agreement between the Owner and Contractor, and all Modifications issued subsequent thereto.

All of the above documents are a part of this Contract and shall be available for inspection by the Supplier upon request. The Contract Drawings and Specifications and any addenda and Modifications issued prior to the execution of this Contract and applicable to it are enumerated in Exhibit A, attached.

ARTICLE II The Supplier shall furnish and deliver to the project the material and equipment listed in **Exhibit B, Contract Sum and Scope of Work**.

ARTICLE III The Contractor shall pay the Supplier for the performance of the Work, subject to additions and deductions by Change Order, the Contract Sum set forth in **Exhibit B, Contract Sum and Scope of Work** plus applicable taxes.

Unless authorization is given in writing by the Contractor for a change in the work, a request for payment for such change in work will not be honored.

ARTICLE IV The Contractor shall pay the Supplier monthly progress payments. Pay estimates are to be submitted in accordance with Contract Documents. Applications for monthly progress payments shall be in writing, shall state the Work in this Contract that has been satisfactorily completed and shall be submitted to the Contractor on or before the 25th day of each month.

The Contractor shall pay the Supplier each progress payment and the final payment under this Sub-contract within five (5) working days after he receives payment from the Owner. The amount of each progress payment to the Supplier shall be equal to the amount allowed for materials and/or equipment suitably stored by the Supplier less the aggregate of previous payments to the Supplier and less the percentage retained as provided in the Contract Documents.

ARTICLE V Before issuance of any payment the Supplier, if required, shall submit evidence satisfactory to the Contractor that all payrolls, bills for materials and equipment, and all known indebtedness connected with the Supplier's Work have been satisfied.

ARTICLE VI The Supplier warrants that all materials and/or equipment furnished by him to the Project shall be new unless otherwise specified, and that all Work under this Contract shall be of good quality, free from faults and defects and in conformance with the Contract Documents. All materials and/or equipment not conforming to these standards may be considered defective. Such warranty shall survive delivery and shall not be deemed waived either by reason of Contractor's acceptance of such materials or articles or by payment for them. Such warranty shall be in addition to and not in limitation of any other warranty or remedy required by law or by the Contract Documents.

ARTICLE VII Should the Supplier at anytime refuse or neglect to supply a sufficiency of material and/or equipment of the proper quality, or fail in any respect to prosecute the work with promptness and diligence, or fail in the performance of any of the agreements herein contained, the Contractor shall be at liberty, after three (3) days written notice to the Supplier, to provide any such materials, and to deduct the cost thereof from any money then due or thereafter to become due to the Supplier under this Contract; and if the Contractor shall deem that such refusal, neglect or failure is sufficient grounds for such action, the Contractor shall also be at liberty to terminate the employment of the Supplier and to complete the performance of this Contract; and in case of such discontinuance the Supplier shall not be entitled to receive any further payment under this Contract until the said Work shall be wholly finished, at which time, if the unpaid balance of the amount to be paid under this Contract shall exceed the expense incurred by the Contractor, completing the Contract, such excess shall be paid by the Contractor to the Supplier; but if such expense shall exceed such unpaid balance, the Supplier shall pay the difference to the Contractor. The expense incurred by the Contractor as herein provided shall include furnishing materials and any expense or other damages incurred through such default.

The supplier shall carry on his work so as not to delay the Contractor or its Subcontractors in any way, nor delay the completion and acceptance of the Project.

ARTICLE VIII SUPPLIER'S RESPONSIBILITIES

The Supplier shall be bound to the Contractor by the terms of this Agreement and of the Contract Documents between the Owner and Contractor and shall assume toward the Contractor all the obligations and responsibilities which the Contractor, by those Documents, assumes toward the Owner, including, but not limited to, obligations of indemnity, and shall have the benefit of all rights, remedies and redress against the Contractor which the Contractor, by those Documents, has against the Owner, insofar as applicable to this Supplier.

The Supplier shall pay for all materials, equipment and labor used in, or in connection with, the performance of this Contract and shall furnish satisfactory evidence, when requested by the Contractor, to verify compliance with the above requirements.

The Supplier shall make all claims promptly to the Contractor for additional work, extensions of time, and damage for delays or otherwise, in accordance with the Contract Documents, and in any event, at least two days prior to the date that the Contractor is required to submit a claim to Owner.

The Supplier shall promptly submit shop drawings and samples as required in order to perform his work efficiently, expeditiously and in a manner that will not cause delay in the progress of the Work of the Contractor, Subcontractors or other Suppliers.

The Supplier agrees to comply with the provisions of Executive Order 11246, as amended by order 11357, and Title VII of the 1964 Civil Rights Act.

The risk of loss for materials and equipment provided by Supplier, whether in a deliverable state or otherwise, shall remain with the Supplier until delivered to the jobsite and actually received by the Contractor, and any damages to the material and equipment or loss of any kind occasioned in transit shall be borne by the Supplier, notwithstanding the manner in which the goods are shipped or who pays the freight or other transportation costs.

Unless otherwise provided, all materials shipped to the jobsite in performance of this Contract shall be shipped prepaid. Failure to so ship and resultant claims by carriers against the Contractor for said shipping costs shall result in payment by Contractor for said charges and set-off against the Contract amount.

If at any time there shall be evidence of any invoice, bill, lien or claim (hereafter "claim") in respect to this Contract for which, if not paid by the Supplier, the Contractor or the Owner of the Project premises might become liable, the Contractor shall have the right to retain out of any payment then due or thereafter to become due an amount sufficient to completely indemnify against such claim. If, within 30 days, the Supplier has failed to resolve the claim for payment, or failed to provide a Bond to protect the Owner and Contractor against such claim, the Contractor shall have the right to make payment on such claim out of funds of the Supplier. If no such funds are available, the Supplier shall refund to the Contractor all monies that the latter has in good faith paid in discharging any such claim.

The Contractor may, at its option, terminate this Contract upon the filing by the Supplier, or the filing against Supplier, in any court pursuant to any statute of the United States or any state, of a petition in bankruptcy or insolvency, or for reorganization, or for appointment of a receiver of a trustee of all or a portion of Supplier's property or upon assignment by the Supplier of the work or funds due under or through this Contract.

ARTICLE IX CONTRACTOR'S RESPONSIBILITIES

The Contractor shall be bound to the Supplier by the terms of this Agreement and of the Contract Documents between the Owner and the Contractor and shall assume toward the Supplier all the obligations and responsibilities that the Owner, by those Documents, assumes toward the Contractor, and shall have the benefit of all rights, remedies and redress against the Supplier, including, but not limited to, rights of indemnity, which the Owner, by those Documents, has against the Contractor, insofar as applicable to this Contract, provided that where any provision of the Contract Documents between the Owner and the Contractor is inconsistent with any provision in this Agreement, the Agreement shall govern.

The Contractor shall promptly notify the Supplier of all modifications to the Contract between the Owner and the Contractor which affect this Contract and which were issued or entered into subsequent to the execution of this Contract.

The Contractor shall permit the Supplier to be present and to submit evidence in any proceeding involving his rights.

ARTICLE X All claims, disputes and other matters in questions arising out of, or relating to, this Contract, or the breach thereof, shall be decided in the same manner and under the same procedure as provided in the Contract Documents with respect to disputes between the Owner and the Contractor.

This Article shall not be deemed a limitation on any rights or remedies which the Supplier may have under any Federal or State mechanics' lien laws or under any applicable labor and material payment bonds unless such rights or remedies are expressly waived by him.

ARTICLE XI The Supplier shall not assign this Contract without the written consent of the Contractor, nor subcontract of the whole of this Contract without the written consent of the Contractor, nor further subcontract portions of this Contract without written notification to the Contractor. The Supplier shall not assign any amounts due or to become due under this Contract without the written approval of the Contractor.

ARTICLE XII The Supplier will provide all insurance required by the Contract Documents.

THIS AGREEMENT CONTAINS A BINDING ARBITRATION PROVISION WHICH MAY BE ENFORCED BY THE PARTIES.

This Agreement executed the day and year first written above.

CONTRACTOR: J. E. Dunn Construction Company	SUPPLIER:
By:_____	By:
Title	Title

SECTION 00 61 13
PERFORMANCE AND PAYMENT BOND FORM

Surety Company MUST provide the following:

Bond No. _____

Phone No:_____

Fax No: _____

SUBCONTRACTOR PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, That _____

_____
(Include Business Address)

(hereinafter called "Principal"), as Principal and _____

_____
(Include Business Address)_

organized and existing under the laws of the state of_____

(hereinafter called the "Surety"), as Surety, are held and firmly bound unto J.E. Dunn Construction Company,(hereinafter called the "Obligee") in the sum of_____

_____

($_____), for the payment of which sum well and truly to be made, the said Principal and Surety bind themselves, and their respective heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Obligee has been awarded a contract (hereinafter called the "Prime Contract").

by_____

_____

for_____

_____ and;

WHEREAS, the Principal has entered into a written subcontract with the Obligee, dated_____

_____to perform as Subcontractor, which Subcontract is hereby referred to and made a part hereof.

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal shall promptly make payment to all persons (a) supplying labor, services, utilities, equipment or any other goods or services, in the prosecution of the work provided for in said Subcontract and any and all modifications of said Subcontract that may hereafter be made; (b) pensions, welfare, vacation and/or supplemental employee benefit contributions payable under collective bargaining agreements with respect to person employed upon such work; (c) federal, state and local taxes and contributions required by law to be withheld or paid with respect to the employment of persons upon said work; and (d) otherwise fully indemnify and save Obligee from and against any claims or liens asserted by any party as a result of payment claimed due or concerning the subcontract, including attorney's fees and expenses, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

The said Surety agrees that no change, extension of time, alteration, addition, omission, or other modification of the terms of either the said Subcontract or the said Prime Contract, or both, or in the said work to be performed, or in the specifications, or in the plans, shall in anywise change its obligation on this Bond, and it does hereby waive notice of any such changes, extensions of time, alterations, additions, omissions, and other modifications.

The said Principal and the said Surety agree that this Bond shall inure to the benefit of all persons supplying labor and material in the prosecution of the work provided for in said Subcontract, as well as to the Obligee, and that such persons may maintain independent actions upon this Bond In their own names.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several seals

this _____day of _____20, _____, 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.

_____ _____(Seal)
(Principal)

Witness: By_____
(Name & Title)

_____ _____
Or Secretary's Attest (Signature)

_____ _____(Seal)
(Surety)

Witness: By_____
(Name & Title

_____ * _____
Or Secretary's Attest (Signature)

*Attach Power-of-Attorney

Rev. 2012 10 03

Surety Company MUST provide the following:

Bond No. _____

Phone No:_____

Fax No: _____

SUBCONTRACTOR PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that_____

_____

(Include Business Address)

(hereinafter called the "Principal") as Principal and_____

_____

(Include Business Address)

organized and existing under the laws of the state of_____
(hereinafter called the "Surety"), as Surety, are held and firmly bound unto J.E. Dunn Construction Company.

_____

(hereinafter called the "Obligee") in the sum of_____dollars

and_____/Cents ($_____), for the payment of which sum well and truly to be made, the said Principal and Surety bind themselves, and their respective heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Obligee has been awarded a contract (hereinafter called the "Prime Contract"),

by_____

_____

for_____

_____and;

WHEREAS, the Principal has entered into a written Subcontract with the Obligee, dated_____ 20 _____

to perform, as Subcontractor, which Subcontract is hereby referred to and made a part hereof.

The Surety, for value received, agrees, if requested to do so by the Obligee, to perform fully all of the terms, conditions, obligations, undertakings, covenants, and agreements of the aforesaid Subcontract, as well as any duly authorized modification thereof (collectively, the "Subcontract Obligations"), if the Principal fails, neglects, or refuses to perform fully and complete the Subcontract Obligations. The Surety further agrees to commence the performance and completion of said Subcontract Obligations within ten (10) days after delivery of notice from the Obligee of the failure, neglect, or refusal of the Principal to perform and complete or cause to be performed and completed the Subcontract Obligations, and to perform and complete the same within the time required under said Subcontract (as well as any duly authorized modification thereof), as extended by the period of time elapsing between the date of such failure, neglect, or refusal of the Principal and the date of the delivery of such notice by the Obligee to the Surety. In the event the Surety does not undertake the performance or completion of the Subcontract Obligations, or cause them to be performed and completed within the time stated above, then the Obligee there upon shall have the remaining Subcontract Obligations performed and completed, Surety to remain liable hereunder for all costs and expenses, including attorney fees, at performance and completion.

It is expressly understood and acknowledged by the Surety that the term "Subcontract Obligations" in this Bond includes, but is not limited to: (i) any express or implied warranty obligations owed by the Subcontractor to the Obligee and (ii) any obligation contained in the Subcontract by which Subcontractor is to defend and/or indemnify Obligee against any losses, claims, demands or causes of action.

The Surety agrees that no change, extension of time, alteration, addition, omission, or other modification of the terms of either the Subcontract or the Prime Contract, or both, or in the work to be performed, or in the specifications, or in the plans, shall in any way change the Surety's obligation on this Bond, and the Surety does hereby waive notice of any such changes, extensions of time, alterations, additions, omissions, and other modifications.

The Principal and the Surety agree that this Bond shall inure to the benefit of Obligee, its successors and assigns, and that such persons may maintain independent actions upon the Bond in their own names.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several seals

this _____day of _____20,_____, 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.

_____ _____(Seal)
(Principal)

Witness: By_____
(Name & Title)

_____ _____
Or Secretary's Attest (Signature)

_____ _____(Seal)
(Surety)

By_____
(Name & Title)

_____ * _____
Or Secretary's Attest (Signature)

Rev. 2012 10 03

*Attach Power of Attorney

SECTION 00 62 00
SUBCONTRACTOR and SUPPLIER
PARTIAL WAIVER and AFFIDAVIT

SUBCONTRACTOR AND SUPPLIER PARTIAL WAIVER AND AFFIDAVIT

(Pre-Payment/Conditional)

Subcontractor/Supplier: _____

Project: *MN State Capitol Interior Renovation* **Project No.**: *13063900*

Property (physical address of Project): 75 Rev. Martin Luther King Jr. Blvd. St. Paul, MN 55115

Payment Application No.: _____ **Payment Amount**: _____

Total Amount Paid: _____ **Subcontract Amount:** _____

Last date of work covered by the Payment Application: _____

Contractor: *J.E. Dunn Construction Company*

Beneficiaries: **Contractor, Owner, and other parties, if any, having any interest in the Property**

In consideration of the payment to be made by Contractor to the undersigned Subcontractor/Supplier in the Payment Amount set forth above for work, labor and services and/or materials furnished for the construction of the Project, the undersigned Subcontractor/Supplier, effective upon remittance of the Payment Amount and contingent upon final clearance and payment of valuable consideration of the Payment Amount and being familiar with the penalties for false certification, represents and certifies to the Beneficiaries that:

1. Subcontractor/Supplier a) irrevocably and unconditionally waives and releases the Property, Project and Beneficiaries from; and b) shall defend, indemnify and hold harmless the Property, Project, Beneficiaries, their sureties, guarantors and respective successors and assigns against

- any and all liens, statutory or otherwise, or rights thereof;
- any and all obligations under any bond or guaranty for payment furnished to or by the Beneficiaries, whether pursuant to an agreement or required by law; and
- any other claims of any kind whatsoever, statutory or otherwise, except as specifically claimed in accordance with the subcontract documents

for any and all work, labor, material or equipment furnished by or through said Subcontractor/Supplier, its sub-subcontractors, suppliers, equipment providers and laborers and anything else in connection with the agreement between Contractor and Subcontractor/Supplier ("Subcontract"), through the last date of work covered by the Payment Application except as it pertains to unpaid retainage, if any.

2. The following listed persons or entities are the Subcontractor/Supplier's only sub-subcontractors, equipment providers, materialmen or suppliers for the Project. This partial waiver, or one similar, will be required for all sub-subcontractors, equipment providers, materialmen and suppliers for each payment application. Future payments may be delayed if all documents are not submitted properly.

COMPANY NAME (of your material suppliers and/or subcontractors)	**CONTRACT AMOUNT** (if unknown, list N/A)	**AMOUNT PAID TO DATE** (cumulative amount)	**AMOUNT PAID THIS PERIOD** (thru date listed above)	**REMAING BALANCE LEFT ON CONTRACT**

[ ] Write "none" here if no sub-subcontractors, equipment providers, materialmen or suppliers were used on this Project.

3. Payment in full, less retainage, if any, has been made by the Subcontractor/Supplier through the period covered by all prior payments (a) to all of the Subcontractor/Supplier's sub-subcontractors, equipment providers, materialmen, suppliers and laborers, and (b) for all materials and labor used or furnished by the Subcontractor/Supplier in connection with the performance of the Subcontract, except as noted below:

COMPANY NAME (of your material suppliers and/or subcontractors not paid)	**AMOUNT NOT PAID**	**REASON WHY AMOUNT WAS NOT PAID**

4. Subcontractor/Supplier has complied with Federal, State and Local tax laws, including, without limitation, Income Tax Withholding, Sales Tax, Social Security, Unemployment Compensation and Worker's Compensation laws, insofar as applicable to the performance of the Subcontract. Subcontractor/Supplier has paid, or out of the proceeds of this payment will promptly pay, all sales or use tax due and owing.

5. The undersigned is fully authorized and empowered to execute this instrument for and on behalf of said Subcontractor/Supplier and to bind it hereto and does in fact so execute this Partial Waiver and Affidavit. The undersigned acknowledges and agrees that the Beneficiaries or anyone on their behalf may and will act and rely upon this instrument in releasing any funds due or owing.

6. The remittance of the Payment Amount negotiated and/or endorsed by Subcontractor/Supplier and marked "paid" or otherwise accepted by the bank against which said remittance was drawn shall constitute conclusive proof that said Payment Application was paid and that the Payment Amount thereof was received by Subcontractor/Supplier and this Partial Waiver and Affidavit shall become effective automatically and without requirement of any further act, acknowledgment or receipt on the part of the Subcontractor/Supplier.

Subcontractor/Supplier : _____

By: _____

Title: _____

Date: _____

State of _____)
)
County of _____)

On this _____ day of _____, 20_____, before me personally appeared _____, _____ of _____, known to me to be the person who executed this document and acknowledged to me that he/she executed the same for the purposes therein stated.

_____ _____
Notary Public in and for said County and State Commission Expires

SUBCONTRACTOR AND SUPPLIER PARTIAL WAIVER AND AFFIDAVIT

(Post-Payment/Unconditional)

Subcontractor/Supplier: _____

Project: *MN State Capitol Interior Renovation* **Project No.**: *13063900*

Property (physical address of Project): 75 Rev. Martin Luther King Jr. Blvd. St. Paul, MN 55115

Payment Application No.: _____ **Payment Amount**: _____

Total Amount Paid: _____ **Subcontract Amount:** _____

Last date of work covered by the Payment Application: _____

Contractor: *J.E. Dunn Construction Company*

Beneficiaries: **Contractor, Owner, and other parties, if any, having any interest in the Property**

In consideration of the payment made by Contractor to the undersigned Subcontractor/Supplier in the Payment Amount set forth above for work, labor and services and/or materials furnished for the construction of the Project, the undersigned Subcontractor/Supplier, being familiar with the penalties for false certification, represents and certifies to the Beneficiaries that:

1. Subcontractor/Supplier a) irrevocably and unconditionally waives and releases the Property, Project and Beneficiaries from; and b) shall defend, indemnify and hold harmless the Property, Project, Beneficiaries, their sureties, guarantors and respective successors and assigns against

- any and all liens, statutory or otherwise, or rights thereof;
- any and all obligations under any bond or guaranty for payment furnished to or by the Beneficiaries, whether pursuant to an agreement or required by law; and
- any other claims of any kind whatsoever, statutory or otherwise, except as specifically claimed in accordance with the subcontract documents

for any and all work, labor, material or equipment furnished by or through said Subcontractor/Supplier, its sub-subcontractors, suppliers, equipment providers and laborers and anything else in connection with the agreement between Contractor and Subcontractor/Supplier ("Subcontract"), through the last date of work covered by the Payment Application except as it pertains to unpaid retainage, if any.

2. The following listed persons or entities are the Subcontractor/Supplier's only sub-subcontractors, equipment providers, materialmen or suppliers for the Project. This partial waiver, or one similar, will be required for all sub-subcontractors, equipment providers, materialmen and suppliers for each payment application. Future payments may be delayed if all documents are not submitted properly.

COMPANY NAME (of your material suppliers and/or subcontractors)	**CONTRACT AMOUNT** (if unknown list N/A)	**AMOUNT PAID TO DATE** (cumulative amount)	**AMOUNT PAID THIS PERIOD** (thru date listed above)	**REMAING BALANCE LEFT ON CONTRACT**

[ ] Write "none" here if no sub-subcontractors, equipment providers, materialmen or suppliers were used on this Project.

3. Payment in full, less retainage, if any, has been made by the Subcontractor/Supplier through the period covered by all payments (a) to all of the Subcontractor/Supplier's sub-subcontractors, equipment providers, materialmen, suppliers and laborers, and (b) for all materials and labor used or furnished by the Subcontractor/Supplier in connection with the performance of the Subcontract, except as noted below:

COMPANY NAME (of your material suppliers and/or subcontractors not paid)	**AMOUNT NOT PAID**	**REASON WHY AMOUNT WAS NOT PAID**

4. Subcontractor/Supplier has complied with Federal, State and Local tax laws, including, without limitation, Income Tax Withholding, Sales Tax, Social Security, Unemployment Compensation and Worker's Compensation laws, insofar as applicable to the performance of the Subcontract. Subcontractor/Supplier has paid, or out of the proceeds of the payment will promptly pay, all sales or use tax due and owing.

5. The undersigned is fully authorized and empowered to execute this instrument for and on behalf of said Subcontractor/Supplier and to bind it hereto and does in fact so execute this Partial Waiver and Affidavit. The undersigned acknowledges and agrees that the Beneficiaries or anyone on their behalf may and will act and rely upon this instrument in releasing any funds due or owing.

Subcontractor/Supplier : _____

By: _____

Title: _____

Date: _____

State of _____)
)
County of _____)

On this _____ day of _____, 20_____, before me personally appeared _____, _____ of _____, known to me to be the person who executed this document and acknowledged to me that he/she executed the same for the purposes therein stated.

_____ _____
Notary Public in and for said County and State Commission Expires

SECTION 00 62 01
BILL OF SALE

BILL OF SALE

BUYER: *[J.E. Dunn Construction Company*
9855 W. 78th St.
Eden Prairie, MN 55344]

SELLER: _____
_____
_____

PROJECT: _____
_____

In consideration of payments made by *[J.E. Dunn Construction Company* ("Buyer") referenced in the agreement dated _____, 20_____ receipt of which is hereby acknowledged, Seller declares and certifies that it now possesses, and does hereby grant, sell, transfer, and deliver to Buyer, all right, title and interest in the following goods, material, chattel or equipment ("Goods"):

Description of Material	Estimated Material Quantity and Cost Required for Project	In Storage Beginning of Period Quant./Dollars	Added to Storage this Billing Quant./Dollars	Removed from Storage & Shipped to Site this Period Quant./Dollars	In storage at end of Period Quant./Dollars

As an alternative to completing the list above, include a copy or copies of invoices or other documentation providing the information requested above.

Buyer has all rights and title to the Goods in itself and its executors, administrators and assigns forever. Seller, on behalf of itself, its successors and assigns, will warrant and defend the title to said Goods hereby sold unto Buyer, its successors and assigns, forever, against the lawful claims and demands of all persons.

Buyer shall have free access to enter Seller's premises and to take possession of and utilize, sell, lease or otherwise dispose of the Goods in such a manner as Buyer, in its sole discretion, may elect.

Seller shall mark and identify the described Goods and shall segregate from and shall not commingle such Goods with other goods held by Seller. Seller shall protect and bear the risk of loss or damage to such Goods until final completion and acceptance by Owner in accordance with the terms of the Subcontract/M&E Agreement. Seller, on behalf of its insurance companies insuring the property against loss, waives all rights of subrogation against Buyer.

It is expressly understood and agreed that the acceptance of the Goods described herein is not a waiver of any right of action that the Buyer may have for breach of warranty or any other cause under the Subcontract or M&E Agreement with Seller or at law.

In WITNESS WHEREOF, Seller has executed this Agreement the _____ day of _____, 20___.

Seller: _____

By: _____

Title: _____

Subscribed and sworn to before me this ____ day of _____,20___.

_____
Notary Public in and for said County and State

My commission expires

_____

SECTION 00 62 02
NON-NEGOTIABLE BAILMENT RECEIPT

Minnesota State Capitol – Repairs, Restoration and Preservation (WP-1)

NON-NEGOTIABLE BAILMENT RECEIPT

BAILOR: Owner or Contractor
J.E. Dunn Construction Co.
9855 W. 78th St., Suite 270
Eden Prairie, MN 55344

BAILEE: Subcontractor/Supplier
_____
_____
_____

LOCATION OF STORAGE: _____

The goods, equipment and materials described below are held and stored at the above referenced location pursuant to the Contract by and between Bailee, as Subcontractor/Supplier, and *[J.E. Dunn Construction Company*, as Contractor, for Work to be performed at the *MN State Capitol Interior Renovation* located at 75 Rev. Martin Luther King Jr. Blvd. St. Paul, MN 55115 . In consideration of payment made to the undersigned Bailee, the receipt and sufficiency of which are admitted, the Bailee agrees:

1. to keep said goods and materials at the above mentioned address, separate and apart from all other goods and identified as subject to this bailment,
2. to keep said goods and materials fully insured against all risk of physical loss or damage,
3. to keep said goods protected from the weather, commingling, vandalism, and/or diversion from said Project, and
4. to deliver said goods and materials to the Project site in conjunction with the performance of Bailee's Contract referenced above or upon the direction of Bailor or its Contractor and no other.

QUANTITY	DESCRIPTION OF ITEM

As an alternative to completing the list above, include a separate list or other documentation providing the information requested above.

The Bailee acknowledges that it has no ownership rights or title in, nor shall claim any lien upon, said goods and materials.

Agreed and Acknowledged:

Subcontractor/Supplier, Bailee

Dated: _____

By: _____
Authorized Signature

SECTION 00 62 76
APPLICATION and CERTIFICATE FOR PAYMENT
AIA DOCUMENTS G702 and G703

AIA® Document G702™ – 1992

Application and Certificate for Payment

TO OWNER:

PROJECT: -

APPLICATION NO: 002
PERIOD TO:
CONTRACT FOR:
CONTRACT DATE:
PROJECT NOS: / /

Distribution to:
OWNER:
ARCHITECT:
CONTRACTOR:
FIELD:
OTHER:

FROM CONTRACTOR:

VIA ARCHITECT:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet, AIA Document G703, is attached.

1. ORIGINAL CONTRACT SUM ..... $ 0.00

2. NET CHANGE BY CHANGE ORDERS ..... $ 0.00

3. CONTRACT SUM TO DATE (Line 1 ± 2) ..... $ 0.00

4. TOTAL COMPLETED & STORED TO DATE (Column G on G703) ..... $ 0.00

5. RETAINAGE:

a. 0 % of Completed Work
(Column D + E on G703) $ 0.00

b. 0 % of Stored Material
(Column F on G703) $ 0.00

Total Retainage (Lines 5a + 5b or Total in Column I of G703) ..... $ 0.00

6. TOTAL EARNED LESS RETAINAGE ..... $ 0.00
(Line 4 Less Line 5 Total)

7. LESS PREVIOUS CERTIFICATES FOR PAYMENT ..... $ 0.00
(Line 6 from prior Certificate)

8. CURRENT PAYMENT DUE ..... $ 0.00

9. BALANCE TO FINISH, INCLUDING RETAINAGE
(Line 3 less Line 6) $ 0.00

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$ 0.00	$ 0.00
Total approved this Month	$ 0.00	$ 0.00
TOTALS	$ 0.00	$ 0.00
NET CHANGES by Change Order	$ 0.00	

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of:

County of:

Subscribed and sworn to before me this day of

Notary Public:

My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED ..... $ 0.00

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

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User Notes: (2020303663)

AIA® Document G703™ – 1992

Continuation Sheet

AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT, containing Contractor's signed certification is attached.
In tabulations below, amounts are in US dollars.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO: 001
APPLICATION DATE:
PERIOD TO:
ARCHITECT'S PROJECT NO:

A	B	C	D	E	F	G		H	I
			WORK COMPLETED						
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G ÷ C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
	GRAND TOTAL	$0.00	$0.00	$0.00	$0.00	$0.00	0.00 %	$0.00	$0.00

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User Notes:

(892030576)

SECTION 00 65 00
SUBCONTRACTOR and SUPPLIER
FINAL WAIVER and AFFIDAVIT

Minnesota State Capitol – Repairs, Restoration and Preservation (WP-1)

SUBCONTRACTOR AND SUPPLIER FINAL WAIVER AND AFFIDAVIT

(Pre-Payment/Conditional)

Subcontractor/Supplier: _____

Project: *MN State Capitol Interior Renovation* **Project No.**: *13063900*

Property (physical address of Project): *75 Rev. Martin Luther King Jr. Blvd. St. Paul, MN 55115*

Payment Application No.: _____ **Final Payment Amount**: _____

Total Amount Paid: _____ **Subcontract Amount:** _____

Last date of work covered by the Payment Application: _____

Contractor: *J.E. Dunn Construction Company*

Beneficiaries: **Contractor, Owner, and other parties, if any, having any interest in the Property**

In consideration of the previous payments made and the final payment to be made by Contractor to the undersigned Subcontractor/Supplier for work, labor and services and/or materials furnished for the construction of the Project, the undersigned Subcontractor/Supplier, effective upon remittance of the Final Payment Amount and contingent upon final clearance and payment of valuable consideration of the Final Payment Amount and being familiar with the penalties for false certification, represents and certifies to the Beneficiaries that:

1. Subcontractor/Supplier a) irrevocably and unconditionally waives and releases the Property, Project and Beneficiaries from; and b) shall defend, indemnify and hold harmless the Property, Project, Beneficiaries, their sureties, guarantors and respective successors and assigns against:

- any and all liens, statutory or otherwise, or rights thereof;
- any and all obligations under any bond or guaranty for payment furnished to or by the Beneficiaries, whether pursuant to an agreement or required by law; and
- any other claims of any kind whatsoever, statutory or otherwise, except as specifically claimed in accordance with the subcontract documents.

for any and all work, labor, material or equipment furnished by or through said Subcontractor/Supplier, its sub-subcontractors, suppliers, equipment providers and laborers and anything else in connection with the agreement between Contractor and Subcontractor/Supplier ("Subcontract"), Property and Project.

2. The following listed persons or entities are the Subcontractor's or Supplier's only sub-subcontractors, equipment providers, materialmen or suppliers for the Project. This final waiver, or one similar, will be required for all sub-subcontractors, equipment providers, materialmen and suppliers. Final payment may be delayed if all documents are not submitted properly.

COMPANY NAME (of your material suppliers and/or subcontractors)	**CONTRACT AMOUNT** (if unknown list N/A)	**AMOUNT PAID TO DATE** (cumulative amount)	**AMOUNT PAID THIS PERIOD** (thru date listed above)	**REMAING BALANCE LEFT ON CONTRACT**

Write "none" here if no sub-subcontractors, equipment providers, materialmen or suppliers were used on this Project.

3. The previous amounts paid and the Final Payment Amount requested for the work and labor performed and material and equipment supplied on the Project represents the actual value of work and material provided

under the terms of the Subcontract and all authorized changes thereto concerning work to be performed on the Property.

4. Payment in full has been made by the Subcontractor/Supplier through the periods covered by all prior payment applications (a) to all of the Subcontractor's or Supplier's sub-subcontractors, equipment providers, materialmen, suppliers and laborers, and (b) for all materials and labor used or furnished by the Subcontractor/Supplier in connection with the performance of the Subcontract, except as noted below:

COMPANY NAME (of your material suppliers and/or subcontractors not paid)	**AMOUNT NOT PAID**	**REASON WHY AMOUNT WAS NOT PAID**

5. Subcontractor/Supplier has complied with Federal, State and Local tax laws, including, without limitation, Income Tax Withholding, Sales Tax, Social Security, Unemployment Compensation and Worker's Compensation laws, insofar as applicable to the performance of the Subcontract. The Subcontractor/Supplier has paid, or out of the proceeds of this payment will promptly pay, all sales or use tax due and owing.

6. The undersigned is fully authorized and empowered to execute this instrument for and on behalf of said Subcontractor/Supplier and to bind it hereto and does in fact so execute this Final Waiver & Affidavit. The undersigned acknowledges and agrees that the Beneficiaries, or anyone on their behalf, may and will act and rely upon this instrument in releasing any funds due or owing.

7. The remittance of the Final Payment Amount negotiated and/or endorsed by Subcontractor/Supplier and marked "paid" or otherwise accepted by the bank against which said Final Payment Amount was drawn shall constitute conclusive proof that said Final Payment Application was paid and that the Final Payment Amount thereof was received by Subcontractor/Supplier and this Final Waiver & Affidavit shall become effective automatically and without requirement of any further act, acknowledgment or receipt on the part of the Subcontractor/Supplier.

Subcontractor/Supplier : _____

By: _____

Title: _____

Date: _____

State of _____)
)
County of _____)

On this _____ day of _____, 20_____, before me personally appeared _____, _____ of _____, known to me to be the person who executed this document and acknowledged to me that he/she executed the same for the purposes therein stated.

_____ _____
Notary Public in and for said County and State Commission Expires

SUBCONTRACTOR AND SUPPLIER FINAL WAIVER AND AFFIDAVIT
(Post-Payment/Unconditional)

Subcontractor/Supplier: *]*

Project: *MN State Capitol Interior Renovation* **Project No.**: 13063900

Property (physical address of Project): *75 Rev. Martin Luther King Jr. Blvd. St. Paul, MN 55115*

Payment Application No.: _____ **Final Payment Amount**: _____

Total Amount Paid: _____ **Subcontract Amount:** _____

Last date of work covered by the Payment Application: _____

Contractor: *J.E. Dunn Construction Company*

Beneficiaries: **Contractor, Owner, and other parties, if any, having any interest in the Property**

In consideration of the payments made of the Final Payment Amount and all previous payment amounts by Contractor to the undersigned Subcontractor/Supplier for work, labor and services and/or materials furnished for the construction of the Project, the undersigned Subcontractor/Supplier, being familiar with the penalties for false certification, represents and certifies to the Beneficiaries that:

1. Subcontractor/Supplier a) irrevocably and unconditionally waives and releases the Property, Project and Beneficiaries from; and b) shall defend, indemnify and hold harmless the Property, Project, Beneficiaries, their sureties, guarantors and respective successors and assigns against:

- any and all liens, statutory or otherwise, or rights thereof;
- any and all obligations under any bond or guaranty for payment furnished to or by the Beneficiaries, whether pursuant to an agreement or required by law; and
- any other claims of any kind whatsoever, statutory or otherwise, except as specifically claimed in accordance with the subcontract documents.

for any and all work, labor, material or equipment furnished by or through said Subcontractor/Supplier, its sub-subcontractors, suppliers, equipment providers and laborers and anything else in connection with the agreement between Contractor and Subcontractor/Supplier ("Subcontract"), Property and Project.

2. The following listed persons or entities are the Subcontractor's or Supplier's only sub-subcontractors, equipment providers, materialmen or suppliers for the Project. This final waiver, or one similar, will be required for all sub-subcontractors, equipment providers, materialmen and suppliers.

COMPANY NAME (of your material suppliers and/or subcontractors)	**CONTRACT AMOUNT** (if unknown list N/A)	**AMOUNT PAID TO DATE** (cumulative amount)	**AMOUNT PAID THIS PERIOD** (thru date listed above)	**REMAING BALANCE LEFT ON CONTRACT**

Write "none" here if no sub-subcontractors, equipment providers, materialmen or suppliers were used on this Project.

3. The Final Payment Amount and all previous payment amounts for the work and labor performed and material and equipment supplied on the Project represents the actual value of work and material provided under the terms of the Subcontract and all authorized changes thereto concerning work to be performed on the Property.

4. Payment in full has been made by the Subcontractor/Supplier through the periods covered by all prior payment applications (a) to all of the Subcontractor's or Supplier's sub-subcontractors, equipment providers, materialmen, suppliers and laborers, and (b) for all materials and labor used or furnished by the Subcontractor/Supplier in connection with the performance of the Subcontract, except as noted below:

COMPANY NAME (of your material suppliers and/or subcontractors not paid)	**AMOUNT NOT PAID**	**REASON WHY AMOUNT WAS NOT PAID**

5. Subcontractor/Supplier has complied with Federal, State and Local tax laws, including, without limitation, Income Tax Withholding, Sales Tax, Social Security, Unemployment Compensation and Worker's Compensation laws, insofar as applicable to the performance of the Subcontract. The Subcontractor/Supplier has paid, or out of the proceeds of this payment will promptly pay, all sales or use tax due and owing.

6. The undersigned is fully authorized and empowered to execute this instrument for and on behalf of said Subcontractor/Supplier and to bind it hereto and does in fact so execute this Final Waiver & Affidavit. The undersigned acknowledges and agrees that the Beneficiaries, or anyone on their behalf, may and will act and rely upon this instrument in releasing any funds due or owing.

Subcontractor/Supplier : _____

By: _____

Title: _____

Date: _____

State of _____)
)
County of _____)

On this _____ day of _____, 20_____, before me personally appeared _____, _____ of _____, known to me to be the person who executed this document and acknowledged to me that he/she executed the same for the purposes therein stated.

_____ _____
Notary Public in and for said County and State Commission Expires

DOCUMENT 00 72 00
GENERAL CONDITIONS

The AIA A201-2007 shall serve as the General Conditions of the Contract.

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AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
The Repairs, Restoration and Preservation to the Minnesota State Capitol Building in Saint Paul, MN
Owner's Project Number 02CB0015

THE OWNER:
(Name, legal status and address)
State of Minnesota
Department of Administration
Real Estate and Construction Services

THE ARCHITECT:
(Name, legal status and address)
Hammel, Green, Abrahamson (HGA), Inc.420 5th Street North, Suite 100, Minneapolis, MN 55401

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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2.3, 2.4, 3.3.1, 3.9, 3.12.9, 3.12.10, 5.2.1, 8.2.2, 9.7, 9.10, 10.2.2, 10.3, 11.1.3, 11.4.6, 12.2.2, 12.2.4, **13.3**, 14, 15.4.1
Written Orders
1.1.1, 2.3, 3.9, 7, 8.2.2, 11.4.9, 12.1, 12.2, 13.5.2, 14.3.1, 15.1.2

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents (hereinafter Contract, Contract Documents or Agreement) consist of the Agreement between the Owner and Contractor, the Payment and Performance Bond, the Corporate Acknowledgement or Individual and Co partnership Acknowledgement, or Limited Liability Acknowledgement, the General, Supplementary and Special Conditions of the Contract, drawings, specifications, bidding documents, addenda, other documents listed in the Agreement, and modifications issued and duly authorized after execution of the agreements.

.1.a. For purposes of this document, the term "Architect" shall mean "Architect or Engineer of Record.

.1.b. For purposes of this document the term "Change Order" shall be shall be defined as "Supplemental Agreement"..

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire integrated agreement between the parties hereto and supersedes prior negotiations, representations, agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect, (2) between the Owner and a Subcontractor or a sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.7.1. The Project Manual is a volume assembled for the Work which includes bidding requirements, sample forms, General Conditions of the Contract and Specifications or other Instruments of Service.

§ 1.1.8 INITIAL DECISION MAKER – NOT USED

§ 1.1.9 BIDDING DOCUMENTS

The Bidding Documents are the advertisement for bids, the instructions to bidders, sample forms, the Contractor's bid and addenda relating to any of these.

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§1.1.10 ADDENDUM OR ADDENDA

The addendum or addenda are any written changes, bulletins, revisions or clarifications of the Contract Documents which have been duly issued by the Architect to prospective bidders prior to the time of the Owner receiving bid proposals.

§1.1.11 MODIFICATION

A modification is (1) a Change Order (Supplemental Agreement), (2) a Construction Change Directive, (3) or a written order for a - change in the work issued by the Architect and approved by Owner, pursuant to Article 7.4 or a written order for a change in the work or contract issued by the Owner..pursuant to Article 7.4.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results. In the event of an inconsistency between the drawings and specifications, or within either, where the inconsistency is not clarified by addendum, the better quality or greater quantity of work shall be required as determined by the Architect. Addenda and modifications of the Contract Documents, as defined in Section 1.1.10 and 1.1.11 shall take precedence over the original Contract Documents.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 Any and all documents produced for the State become the property of the State and the State therefore maintains any copyright on these documents. The Contract Documents, in whole or in part, and copies thereof, are to be used by the Contractor only in respect to this project and shall not be used by the Contractor for any other purpose.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

§ 1.7 USE OF STATE PROJECT MANAGEMENT SOFTWARE

The Owner may, at its sole option, direct the Architect, Construction Manager, Contractor (as applicable), and/or other Project participants to utilize the internet-based Project Management Software selected by the Owner. The

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functionality of this software may include, but is not limited to, the processing of the Plan Reviews, Purchase Orders, Change Orders, Payment Applications, Requests for Information, and Document and Schedule Management related to the Project.

If the Owner chooses to utilize Project Management Software selected by the Owner, the Owner will provide or arrange for a login license for the applicable parties, at no cost to the applicable parties.

The Owner will provide or arrange for initial software training to the applicable parties. Except for licenses and initial training, the Owner assumes no responsibility for any real or potential costs associated with the use of the software by the applicable parties.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The terms "Owner", "State", or "State of Minnesota" wherever they appear in the Contract Documents is the State of Minnesota. The authorized representative for the State of Minnesota is the Commissioner of Administration or his/her representative. Unless noted otherwise, the Commissioner's representative for the discharge of this Contract is the Division of Real Estate and Construction Services.

§ 2.1.2 NOT USED

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 NOT USED

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site and any other information it has available. Within 20 days of receipt, the Contractor is required to review any materials (such as surveys, soil tests, existing structures or conditions, locations of utilities, etc) furnished by the Owner, and notify the Owner of the discovery of any inaccuracy. The furnishing of this material by the Owner shall not relieve the Contractor of its responsibilities under the Contract Documents. The Owner will provide any information required by the Contract Documents reasonably necessary to execute the work. The Owner makes no representations, warranties or guarantees as to the accuracy of information provided to the contractor.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.2.6 Security features of building plans, specifications, and drawings of state owned facilities and non-state owned facilities leased by the state are classified as nonpublic data when maintained by the Department of Administration and may be shared with anyone as needed to perform duties of the commissioner. However, consultants and contractors shall not release these plans and specifications to anyone without the Owner's approval.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

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§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor fails or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such failure or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. The amounts charged to the Contractor are subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. Article 15, Claims and Disputes does not apply to a request by the Owner that the Architect approve the use of the remedy provided in Section 2.4.

§2.5 OWNER'S USE OF THE PROJECT

The Owner shall have the right to take possession of and use completed or partially completed portions of the work even though the time of completing the entire work, or such portion thereof, may not have expired, and such use shall not constitute acceptance thereof. The Owner's possession will not interfere with the Contractor's work. The Owner may engage in move-in activities such as furniture installation but will not physically occupy the work until such work is accepted by, and occupancy permit is issued by, the code jurisdiction of authority.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents. The Contractor shall not perform any work unless and until the Contractor is in compliance with Article 3.11.1 -Documents and Samples at the Site.

§ 3.1.3 The Contractor, when requested by the Architect, shall meet with the Architect and the Architect's representative and consultants, at reasonable times and furnish all information requested. The Contractor shall allow the Architect, the Architect's representatives and consultants full access to the work to facilitate inspection of the Work. Neither the Owner nor Architect shall be liable to the Contractor for extra compensation or damages for interference or delays on account of any meeting, and, the supply of information, tests or inspections. The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Owner, the Architect, in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by the Owner, the Architect, or persons or entities other than the Contractor. Claims may be made in accordance with Article 15 of the AIA A201.

§ 3.1.4 The contractor shall employ and/or subcontract with subcontractors that are qualified to successfully complete the Work indicated in the Contract Documents and within the contract time specified.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall make every effort to identify inconsistencies that may exist. Before starting each portion of the Work, carefully study and compare the Drawings, Specifications, Addenda and other Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, and shall observe and take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. The Contractor shall promptly report in writing to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. The Architect will

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respond pursuant to Sections 4.2.11 and 4.2.12. The Contractor shall not start any portion of the Work if uncertain about the meaning or intent of the Contract Documents. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2, 3.2.3 and 3.2.5, the Contractor shall make claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 and 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations.

§ 3.2.4 The Contractor shall be responsible for accurately staking new work on the site, and shall run the axis lines locating the work, establish correct datum points, and check each line and point on the site to ensure accuracy. All such lines and points shall be carefully preserved throughout construction. The Contractor shall (1) lay out all work from dimensions given on drawings, (2) take measurements and verify dimensions of existing or old work, if any, that affect the work or to which its work is to be fitted, (3) be responsible for the correctness of all measurements and shall verify all grades, lines, levels, elevations and dimensions shown on the drawings, and (4) report any errors or inconsistencies to the Architect prior to commencing work in the form as the Architect may require.

§ 3.2.5 No Change to the Contract Sum will be allowed on account of minor differences between actual field conditions and the Contract Documents. A minor difference is defined as a requirement in the contract documents that is not materially different from the actual field condition(s).

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. The Owner or the Architect, shall be responsible for damages arising from the Owner, or the Architect, respectively, for knowingly directing the Contractor to perform unsafe work. Nothing in this Section 3.3.1 shall be construed as limiting any claims the Owner or Contractor may have against the Architect for any such loss or damages.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. Should the Contract Documents specifically require work to be performed beyond normal working hours, weekends or holidays, or should the completion time require work to be performed at said times, or, should the Contractor elect to perform work at said times, with the permission of the Owner, any additional costs resulting from working at said times are the Contractor's sole responsibility under the GMP amendment work and are not grounds for a Change Order.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive. By making a request for a

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substitution, the Contractor:

.1 Represents that the Contractor has personally investigated the proposed substitute item, material and/or process, and determined that it is equal or superior in all respects to that specified.

.2 Represents that the Contractor will provide the same or better warranty for the substitute item than that provided with the specified item.

.3 Certifies that the cost data presented at the time of the request is complete and includes all related costs under this contract, including the Architect's review and redesign costs, and waives all other claims for additional costs related to the substitution that are not presented with the request.

.4 Will coordinate the installation of the accepted substitute, implementing minor changes that are required for the work to be completed, in accordance with Article 7.4

The above representations, certifications and agreement to coordinate do not obligate the Owner to consent to the substitution. Owner consent to the substitution does not constitute approval of the cost data submitted, unless the cost data is specifically approved in writing.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them. The Contractor shall, upon the Owner's request, remove any subcontractor that is unqualified, intemperate, disorderly, is performing work in an unsafe manner, or has failed to comply with the terms of any permit applicable to the Work or requirements applicable to the work".

§ 3.4.4 HAZARDOUS MATERIALS BANNED

§ 3.4.4.1 PRODUCTS CONTAINING CERTAIN TYPES OF POLYBROMINATED DIPHENYL ETHER BANNED.

Contractor certifies that it has read and will comply with Laws of Minnesota, 2007, Chapter 57 (to be codified at Minn. Stat. §§ 325E.385-325E.388) as provided below.

§ 3.4.4.2 ASBESTOS CONTAINING MATERIALS BANNED

No asbestos containing materials shall be brought on the project site, installed on the project, or used in the installation of Work for the project. See Section 10.3 – Hazardous Materials.

§ 3.4.4.3 RESTRICTIONS ON PURCHASING AND USE OF UNDILUTED COAL TAR SEALERS

Undiluted coal tar sealers will not be used on the project. Undiluted coal tar sealers are defined as any sealant containing coal tar that has not been mixed with asphalt and is intended for use on asphalt surfaces, including driveways and parking lots. See the 2009 MN Statutes §116.201.

§ 3.4.5 RECYCLING AND WASTE MANAGEMENT

For all State bonded construction, renovation, or demolition projects costing $5,000,000.00 or greater that are located within 40 miles of a construction and demolition waste recycling facility, the Contractor and any subcontractors must divert from deposit in a landfill and must recycle at least 50 percent of the nonhazardous construction and demolition waste, measured by tonnage or volume, produced by the project or demonstrate that the waste was delivered to construction and demolition waste recycling facilities that maintain a 50 percent annual recycling rate. The Contractor shall submit a Waste Management and Recycling Program Plan for these projects to the Architect who shall review and submit it to the State for final approval. If the project plans and specifications for the project carry a more stringent requirement for recycling as it applies to quantity recycled, project cost, project funding source, or haul distance to a recycling facility, the more stringent requirement will apply.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of specified or superior quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. The warranty is not limited by the provisions of Section 12.2. Guarantees required by the Contract Documents shall

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not exclude or otherwise limit the Owner's possible remedies at law and shall not be construed as a waiver by the Owner of any other remedy.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for all other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received. **All such fees, including sewer and water access charges, Minnesota Pollution Control Agency general storm water permits, and Federal Water Permits, , shall be paid by the Contractor and failure to account for all such charges shall not increase the Contract Sum unless allowances were identified in the construction documents.** Total fees charged for a Building Permit may not exceed the amount prescribed in the latest edition of the Minnesota State Building Code. Procurement of permits does not relieve the Contractor of the requirement for complying with the Contract Documents that exceed the requirement of governing laws, ordinances and statutes.

§3.7.1.1 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

(NPDES) PERMIT. Pollution of natural resources of air, land and water by operations under this Contract shall be prevented, controlled, and abated in accordance with the rules, regulations, and standards adopted and established by the Minnesota Pollution Control Agency (M.P.C.A.) and the following:

.1 By signing the Contract and completing the NPDES permit application, the Contractor is a co-permitee with the Owner to ensure compliance with the terms and conditions of the General Storm Water Permit for Construction Activity (MN R100001) and is responsible for those portions of the permit where the operator is referenced. This Permit establishes conditions for discharging storm water to waters of the State from construction activities disturbing one acre or more of total land area. A copy of the "General Permit Authorization to Discharge Storm Water Associated with a Construction Activity Under the National Pollutant Discharge Elimination System (NPDES)/State Disposal System Permit Program" is available at:

http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/construction-stormwater/construction-stormwater.html

.2 The Contractor shall apply and pay for the NPDES Permit on this Project. Payment for the application shall be incidental to the Contract and no direct compensation will be made. The Owner will provide the Contractor information on how to complete the Owner's portion.

.3 No work which disturbs soil and/or work in waters of the state will be allowed on this Project until the NPDES Permit is in effect and the department has received the required documentation.

.4 The Contractor shall be solely responsible for complying with the requirements listed in Part II.B and Part IV of the General Permit.

.5 The Contractor shall be responsible for providing all inspections, documentation, record keeping, maintenance, remedial actions, and repairs required by the permit. All inspections, maintenance, and records required in the General Permit Paragraph IV.E, shall be the sole responsibility of the Contractor. The word "Permitee" in these referenced paragraphs shall mean "Contractor". Standard forms for logging all required inspection and maintenance activities shall be used by the Contractor. All inspection and maintenance forms used on this Project shall be turned over to the Architect/Engineer every two weeks for retention in accordance with the permit.

.6 The Contractor shall have all logs, documentation, inspection reports on site for the Architect/Engineer's review and shall post the permit and MPCA's letter of coverage on site. Meetings with the MPCA, Watershed District, WMO, or any local authority shall be attended by both the Architect/Engineer and the Contractor or

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their representatives; the Contractor and/or the Architect/Engineer shall contact the Owner prior to a scheduled meeting. No work required by said entities, and for which the Contractor would request additional compensation from the Owner, shall be started without approval from the Architect/Engineer. No work required by said entities and for which the changes will impact the design or requirements of the Contract documents shall be started without approval from the Engineer.

.7 The Contractor shall immediately notify the Engineer of any site visits by Local Permitting Authorities performed in accordance with Part V.H.

.8 Emergency Best Management Practices must be enacted to help minimize turbidity of surface waters and relieve runoff from extreme weather events. It is required to notify the MPCA Regional contact person within 2 days of an uncontrolled storm water release.

.9 The names and phone numbers of the MPCA Regional Contact personnel can be found at: http://www.pca.state.mn.us/water/stormwater/stormwater-c.html. The Contractor is reminded, during emergency situations involving uncontrolled storm water releases that the State Duty Office must be contacted immediately at 1-800-422-0798 or 1-651-649-5451.

.10 The Contractor shall review and abide by the instructions contained in the permit package. The contractor shall hold the Owner harmless for any fines or sanctions caused by the Contractor's actions or inactions regarding compliance with the permit or erosion control provisions of the Contract Documents.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. Except in those Municipalities that provide State-approved electrical inspection, all installation of electrical work shall be inspected by the Minnesota Board of Electricity. The Contractor shall procure and pay for all required electrical inspections.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction. This requirement does not relieve the Contractor of the responsibility for complying with the Contract Documents if the Contract Documents requirements exceed those of governing codes and regulations.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those affirmatively indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that could not have been anticipated and which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, or (3) are not observable prior to bidding or inferable by the type of construction, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those affirmatively indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, or archaeological sites not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15. Additionally, Contractors shall comply with Minnesota Statute 307.08

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§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall be assigned continuously to the work from Notice to Proceed until Final Completion. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. The Contractor shall communicate with the Owner through the Architect.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed, and, the Contractor shall not change the Superintendent unless the Superintendent ceases to be employed by the Contractor."

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, no later than ten (10) days following the date on which the Contractor received written notice to proceed from the Owner, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare and keep current, for the Architect's approval, a schedule of submittals which is coordinated with the Contractor's construction schedule and allows the Architect reasonable time to review submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§3.10.4 The schedule submitted by the Contractor shall have a completion date that corresponds to the completion date set forth in the Contract Documents. The Contractor is responsible for meeting this schedule without any adjustment to the Contract Sum, and by executing the Contract, the Contractor confirms that it is capable of properly completing the work within the completion date set forth in the Contract Documents."

§3.10.5 The Contractor must provide a minimum of five working days prior notice for specified testing or inspections

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that are to be performed by the Owner or Separate Contractors. Such testing and inspections shall be included in the Contractor's schedule."

§3.10.6 If the Contractor, Architect, or Owner determines at any time, and for any reason, that the work has fallen fifteen (15) calendar days or ten (10) working days, behind the scheduled contract time, milestone date, phased work completion date, critical path date, or work indicated on the latest submitted schedule, the Contractor shall submit a Recovery Schedule within seven (7) calendar days of the Architect's written request or date the Contractor has knowledge that the work has fallen behind. The Contractor shall also submit a Recovery Plan indicating actions to be taken to recover the schedule. The Recovery Plan shall document the following:

.1 Description of work that is behind schedule
.2 Reason for work being behind schedule. If the Contractor claims that the delay is due to an event or condition that was outside the Contractor's ability to control, the Contractor shall include all documentation sufficient to justify the delay in accordance with Articles 8.3.1, 8.3.2, and 8.3.3.
.3 Identification of all resources necessary to recover the schedule including all materials, labor, equipment and changes in operations.
.4 Detail of all additional resources necessary to recover the schedule including, but not limited to additional quantities of manpower, overtime, increased number of hours per day, increased number of work shifts per day, increased number of work days per week.
.5 Duration of time necessary to Recover the Schedule.

The Contractor shall implement the Recovery Plan and recover the schedule at no cost to the owner and no additional contract time unless the claim is substantiated and approved in accordance with Section 8.3 and Article 15.

A breach and default of contract shall result from the Contractor's failure to provide the Architect and Owner with the Recovery Plan and Recovery Schedule and/or failure to implement the Recovery Plan.

Should the Contractor claim and provide sufficient documentation to substantiate that the delay was beyond the control of the Contractor the Owner shall reserve the right, in its best interest, to determine if the Recovery Plan and Schedule shall be implemented.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

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§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents including future and related work contained in the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor is responsible for all cutting, patching, drilling, fastening, anchoring of all new and existing construction required to complete the work. All areas shall be restored to the condition existing prior to the cutting, patching, drilling, fastening, anchoring, and fitting unless otherwise required by the Contract Documents.

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§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 The cost of cleanup performed by the Owner as a result of the Contractor's failure to provide the cleanup required by the Contract Documents, shall be deducted from the Contract Sum.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner, Architect, their consultants, other persons authorized by the Owner and Authorities having jurisdiction over the work, access at all times to the project site and to Work in progress, in preparation or completed. The Contractor shall provide safe and proper facilities for such access and for testing, inspections and separate Contracts and shall secure and protect samples and testing equipment.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law, and in accordance with Article 11, the Contractor shall indemnify and hold harmless the Owner, Owners' Representatives, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

§3.18.3 The obligations of the Contractor under this Section 3.18 shall not negate, abridge or reduce the liability of the Architect, the Architect's consultants and agents and employees of any of them.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The term or word "Architect" or "Architect of Record" used in the Contract Documents shall mean Architect, Engineer, Designer, or other person or entity designated by the Owner to perform the Architect's role required by the Contract Documents.

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§ 4.1.2 The Owner shall have sole authority to modify or extend the authority of the Architect.

§ 4.1.3 If the Architect of record for the Contract is no longer employed by the Owner or is otherwise unable to fulfill the required obligations of the Contract, the Owner shall designate a responsible party to fulfill the obligations under the Contract. The Owner reserves the right to designate itself.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the final payment is due. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work. However, where the Architect observes deficiencies in the Work, or where the Architect observes the Contractor or Subcontractor failing to execute the work in accordance with the Contract Documents, the Architect shall, within 24 hours, notify the Contractor and Owner, in writing, of all such deficiencies. The Architect shall promptly notify the Owner when, in the Architect's opinion, the work should be stopped. Authority to stop the work shall rest with the Owner.

§ 4.2.4 Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner. The Owner may communicate directly with the Contractor and Subcontractors and advise the Architect of those communications.

§ 4.2.5 Based on project site observations and evaluations of the Contractor's application for payment, the Architect shall determine the amount owing to the Contractor and shall sign and issue the application and certificate for payment. Such signature and issuance shall constitute a representation by the Architect to the Owner that, in the Architect's professional opinion, the work has progressed to the point indicated, the quality of the work is in accordance with the Contract Documents, and the Contractor is entitled to payment in the amount certified. The Architect is responsible for deducting from the Contractor's Application for Payment the value of work not completed, not conforming to Contract Documents, or otherwise in dispute.

§ 4.2.6 The Architect has authority and responsibility to reject Work that does not conform to the Contract Documents. All such rejected work shall be removed from the site as soon as possible at no expense to the Owner. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

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§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; will receive, review and forward to the Owner, for the Owner's review and records, written warranties, operations and maintenance manuals, and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10. The Architect will determine substantial completion date(s) in accordance with Article 9.8.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. If a question, dispute or controversy between the Owner and Contractor arises out of a provision of the Contract Documents, or the Architect's interpretation thereof, for which a decision process is not otherwise prescribed in the Contract Documents and which the parties are unable to resolve through Change Order or otherwise, the Owner and the Contractor may exercise legal remedies available to them.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

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§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.1.3 The Contractor shall include the following in any Contract with a Subcontractor: The attention of the Subcontractor is directed to Minnesota Statutes, Chapter 574, which requires the prime Contractor to file a payment and performance bond for the project with the State of Minnesota. Section 574.31 of that Chapter states the limit of time within which a subcontractor must take certain actions specified therein to preserve a claim for nonpayment against the payment bond surety. Subcontractors of any tier may not bring claims against the Owner.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, no later than ten (10) days following the date on which the Contractor received written notice to proceed from the Owner, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

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.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases or decreases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 Where multiple Contracts are in effect or the Owner is utilizing its own forces for a portion of the Work, the Contractor's schedule and progress shall govern the work of other Contractors. The Contractor shall provide reasonable advance notice to other Contractors and the Owner regarding the schedule and Work to be performed by them. The other Contractors and/or the Owner's forces shall, after such notification, diligently proceed with their portion of the Work, including furnishing, installation, laying out or incorporation of Work, so as not to delay or impede the Contractor or its job progress.

§ 6.1.4 NOT USED

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly correct damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner's own forces and each separate contractor shall have the same responsibilities for cutting and patching for their work as are described for the Contractor in Section 3.14.

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§ 6.2.6 Claims and disputes between the Contractor and separate Contractors are subject to the provisions of Article 15. The Contractors will indemnify, defend and hold harmless the State, and any of its consultants or agents against any claims arising from any such dispute. Notwithstanding the foregoing, any legal representation to defend the Owner is subject to the approval of the Minnesota Attorney General, and, at the Owner's discretion, the Contractor will pay the attorney fees in lieu of defending the Owner.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will assess the cost to those responsible.

ARTICLE 7 CHANGES IN THE WORK In Article 7, and throughout the contract documents, whenever the term "Change Order" is used, it shall be substituted with the term "Supplemental Agreement". This includes all companion documents utilized for construction contract administration.

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive, written approval from the Owner, or written order for a change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; a written order for a change in the Work may be issued by the Architect alone along with written approval from the Owner; a written approval from the Owner may be issued by the Owner alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.2.2 Methods and requirements used in determining adjustments to the Contract Sum shall include those listed in Sections 7.3.3 and 7.3.7. The Contractor shall provide costs broken down into material and labor units with their respective unit costs in accordance with Section 7.3.7. The Owner shall not be obligated to make payment for change orders or be liable for late payments and interest on changes until the Contractor provides cost breakdowns as required by Section 7.3.7 and until a Change Order is executed.

§ 7.2.3 The Contract sum and Contract time shall be adjusted only by Change Order and the Contractor shall provide documentation of changes in accordance with Section 7.3.3 and 7.3.7. The Contractor shall itemize the costs of the changes and provide material and labor cost breakdowns to support the costs being claimed as a result of the change. The signature of the Contractor on the Change Order binds the Contractor to all terms thereof and shows the Contractor's complete agreement therewith.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly. The Contract Sum and Time can only be changed by a subsequent Change Order.

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§ 7.3.2 A Construction Change Directive shall be used in the absence of agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the change shall be incorporated into the contract by Change Order and the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data provided in accordance with Section 7.3.7, to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 **NOT USED**

.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and a subsequent Change Order shall be executed. A Construction Change Directive signed only by Owner and Architect constitutes a Change in the Contract which the Owner recognizes that the Contractor may be entitled to an adjustment to the Contract Sum if substantiated by the Contractor.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 labor costs are limited to the published and specified prevailing hourly basic rate or the negotiated hourly rate whichever is higher plus applicable multipliers for overtime, weekends and holidays, plus labor burden including: social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance; and actual net payroll taxes. Further markups to labor are not permitted. The Contractor may express labor burden as a fixed percentage of the base hourly rate, however, such percentage is subject to review and adjustment by the Owner at any time. Labor hours may include only workers and working foreman directly involved in performing the Change Order work. Supervision above working foreman (such as general foreman, superintendent, project manager, etc.) is considered to be included in overhead and profit, and not allowed as a line item.

.2 net actual Contractor or Subcontractor costs of itemized materials including applicable sales taxes, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others; equipment with an original purchase cost of more than $500 and when rented from the Contractor or Subcontractor(s), the maximum rate is limited to 75% of the rental rate as set forth in Rental Rate Blue Book for Construction Equipment by Dataquest (latest edition) and shall include fuel and maintenance;

.4 costs of bond premiums, permit fees and taxes incurred by the contractor as a result of additional work that is approved by the owner. Payment for bond premium increases and additional permit fees will be made in accordance with Article 7.2 and upon presentation by the Contractor of proof of payment, or invoice related to the additional Work;

.5 Except for specialty trades and as agreed upon by the Owner, it is the policy of the Owner to pay direct costs for supplemental work plus a reasonable amount for Overhead and Profit (OH&P). In addition to the costs provided for above, Contractors and subcontractors may add up to 10% of the direct cost of

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their own labor, 5% of the direct cost of materials and equipment, and 5% of the cost of subcontractors or sub-subcontractors. The total mark-up for OH&P for all tiers involved in a change to the contract sum shall not exceed 20 percent. OH&P may be less than the foregoing amounts depending on the nature, extent or complexity of the change when it is not commensurate with the responsibility and administration involved with the change, such as the Contractor merely processing a substantial Change Order to a Subcontractor or the Contractor processing a Change Order for additional equipment required by the change. Costs for material distribution, tool and equipment fees, project difficulty, warranties, supervisory equipment, Change Order pricing and preparation or similar fees are defined as overhead cost.

.6 The documentation for adjustment to the Contract sum shall include the following for each Contractor and subcontractor of any tier and must be in form provided by or agreed to by the Owner.

a. Name of Project
b. Name of the Contractor or Subcontractors
c. Name of material and equipment suppliers
d. A detailed description of the work performed and reference to proposal requests and Change Order Directives
e. Breakdown of labor and material costs are mandatory, including subcontractor and material supplier costs.
   1. Labor costs shall include number of hours and hourly rate based on certified payroll.
   2. Material costs shown separately and individually by unit and unit price. The Owner reserves the right to require the submittal of supplier's invoices.
   3. Calculation of the amount of OH&P added; see 7.3.7.5 for OH&P calculation requirements.
   4. Signature of Contractor and involved subcontractors

.7 The Owner may, at the Owner's sole discretion, waive the requirement for the cost breakdown of changes that total $1,500.00 or less and utilize a lump sum.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, amounts not in dispute for such changes in the Work shall be included in Applications for Payment accompanied by a Change Order indicating the parties' agreement with part or all of such costs. For any portion of such cost that remains in dispute, the Architect will make an interim determination for purposes of monthly certification for payment for those costs. That determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a claim in accordance with Article 15..

§ 7.3.10 NOT USED

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor. A subsequent Change Order shall be executed. When a minor change involves an additional cost and adjustment in the Contract Sum or extension of the Contract Time, the change shall require an approval by the Owner. Any change involving product substitutions shall be approved by the Architect and Owner.

§ 7.5 OWNER'S RIGHT TO PERFORM CHANGES IN THE WORK

Notwithstanding Article 6, if the Owner does not agree to the Contractor's proposal to perform changes in the work, or if the Owner does not deem it advisable or expedient to proceed on the basis of the proposal, the Owner reserves the right to perform changes in the work with its own forces, or to contract with others to perform the changes.

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ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.1.5 Where the performance of any act is directed, the time shall be computed so as to exclude the first and include the last day of the prescribed period. When the last day of the period falls on Saturday, Sunday or a legal holiday, that day shall be omitted from the computation.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner for causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15. Extensions of Time will be considered and allowed only under the following conditions and/or circumstances, and only if the construction schedule is adversely affected by the change:

.1 Only those conditions enumerated in Section 8.3.1 above, over which the Contractor has no control will be considered. The burden of proof for the change in time shall rest with the Contractor, including documentation that the condition was beyond its control and documentation as to the extent of the proposed extension.

.2 A delay in the process of the work actually occurs as a result of one of the valid causes for extension.

.3 An unusual delay in delivery occurs solely due to delay in common transport beyond the Contractor's control. An extension of time will not be granted for delays in delivery where the delivery was not properly scheduled or an order not placed at an appropriate time to allow delivery or an order is improperly placed.

.4 With respect to a Change Order proposal for an extension of time due to climatic conditions, the parties shall consider the location of the site and the type of work affected, and shall recognize only unusually severe variations from average conditions. The Contractor must submit, with the request, local U.S. Weather Bureau climatological reports for the period involved plus a report indicating the average precipitation, temperature, wind velocity, etc. for the past 10 years from the nearest reporting station. Foul weather in itself will not be a valid reason for time extension. Requests for time extensions due to weather extremes will only be considered for the overall project based on analysis of the project schedule and will not be considered unless a substantial variation from seasonal average weather conditions occurred for a significant period of time and operations were necessarily affected. If the Contractor encounters unusually favorable weather subsequent to

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the issuance of a time extension for weather, the Contractor shall cooperate with the Owner and Architect to determine a time reduction based on the same analysis of the construction schedule.

.5 For changes in the work which significantly affect the time and process of the entire work and where the anticipated delay period can be reasonably calculated at the time the change is requests, any time extension shall be made no later than when the change is authorized by the Owner, and such extension shall be for such reasonable time as the Architect may determine upon analysis of the project schedule. Where the period of delay cannot be reasonably determined at the time the Owner authorizes the change, the Contract shall estimate the time period of delay, and propose a potential mechanism for the Architect to identify a reasonable extension to Contract time. For changes in the work which do not affect the process of the entire work, the Owner reserves the right to grant a time extension only for area, phase, activity or element in the Work affected by the change. Any approved time extension shall be implemented by a Change Order.

.6 A request for an extension of time made as a result of a labor dispute shall not exceed the actual period of the dispute, plus reasonable mobilization time. Any related, approved extension may be less than the period of dispute, depending on the actual effect the dispute had on the progress of the Work. Lockouts over which the Contractor has control will not be a valid reason for time extension.

.7 No time extension will be granted for delays resulting from improper scheduling or failure to have shop drawings or samples submitted to the Architect in ample time for a review.

.8 Delays caused by Subcontractors will be considered for time extension only under the same conditions defined above.

.9 Except for changes in the work, all requests for extension of time shall be made in writing to the Architect not more than 21 calendar days after the beginning of the first occurrence of the delay. No request will be considered beyond the stated time without the consent of the Owner.

.10 No time extensions will be granted for delays from failure by the Contractor to schedule inspections, testing and the work of separate contracts.

.11 Contractor "float" time built into the project schedule may be proportionately deducted from any approved extension.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, no later than ten (10) days following the date on which the Contractor received written notice to proceed from the Owner, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2., for completed portions of the Work. Such application shall be notarized, and on an Owner prescribed form, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 NOT USED

§ 9.3.1.2 NOT USED

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§ 9.3.1.3 The Contractor shall comply with Section 9.11 and, shall submit payroll records as prescribed therein and in the Contract Documents and the Contractor shall bind all labor and material subcontractors to this requirement for this project and submit subcontractor payroll records as prescribed in Section 9.11 and the Contract Documents.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site. Should the Owner approve and pay for materials stored in an off site location, the Contractor shall insure the off site materials in such a manner as to protect the interest of the Owner against loss of stored materials and against loss of title to and ownership of stored materials.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFYING APPLICATIONS FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, certify the Application for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 Certifying the Application for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. Certifying an Application for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. The Architect is responsible for deducting from the Contractor's Application for Payment, the value of the work not completed, not conforming to the Contract Documents, or otherwise in dispute. To the extend this Section 9.4.2 is inconsistent with Article 15, as amended herein, Article 15 shall govern and be incorporated by reference into this Section 9.4.2.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold an Application for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly certify an Application for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold certification on an Application for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of an Application for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

.1 defective Work not remedied;

.2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

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.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a separate contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 NOT USED

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has certified an Application for Payment, the Owner shall make payment in accordance with Minnesota Statutes 16A.124 which states that the Owner shall make payment within 30 days of receipt by the Owner of non-contested invoices. For this contract, an invoice is defined as an Application for Payment.

§ 9.6.1.1 Unless otherwise provided in the Contract Documents, the Owner shall follow the requirements of MN Statute 15.72 Subd.1 and Subd. 2, and MN Statute 15.73 Subd. 1, Subd. 2, Subd. 3, and Subd. 4. The Owner, in making partial payments, will retain five (5) percent of the duly approved value of the work performed under the Contract Documents as the date of the Contractor's Application for Payment until final completion and acceptance of all work covered by the Contract. The Contractor has the option, with Owner's consent, of depositing bonds or securities in a Bank or Trust Company to be held for the benefit of the Owner, in lieu of cash retainage. In that event, the Owner shall reduce the retainage in an amount equal to the value of the bonds or securities. Interest on the bonds or securities shall be payable to the Contractor as it accrues. Bonds and securities deposited or acquired in lieu of retainage, shall be of a character approved by the State Treasurer, including but not limited to:

.1 Bills, certificates, note or bonds of the United States.
.2 Other obligations of the United States or its agencies.
.3 Obligations of any corporation wholly owned by the Federal Government.
.4 Indebtedness of the Federal national Mortgage Association.

§ 9.6.1.2 If the Owner incurs additional cost as a result of the exercise of the option described above, the Owner may recover the costs from the Contractor by reducing the final payment due under the Contract. As work on the Contract progresses, the Owner shall, upon demand, inform the Contractor of all accrued costs.

§ 9.6.1.3 If, after the work provided for in the Contract shall have been fifty (50) percent completed, and performed to the satisfaction of the architect, the retainage may be reduced to zero (0) percent on payments for the remaining work. The reduction amount is determined at the sole discretion of the Owner, and requires certification by the architect that the Contractor is properly and continuously expediting the work. The Owner reserves the right to retain all or part of retainage after substantial completion until all Contractual obligations are completed in accordance with Section 9.8.5. Partial use or occupancy of the project by the Owner is not sufficient cause for reduction of retainage.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.2.1 In accordance with Minnesota Statutes 16A.1245, the Contractor shall, within 10 days of receipt of a progress payment, pay all Subcontractors and suppliers having an interest in the Contract their prorated share of the payment for all undisputed services provided by the Subcontractors and suppliers.

§ 9.6.2.2 The Contractor may withhold as retainage from Subcontractor(s) progress payments an amount not to exceed five (5) percent of the payment. The Contractor shall reduce or eliminate the retainage for a Subcontractor in the same manner that the Owner reduces or eliminates the retainage for the Contractor.

§ 9.6.2.3 The enforcement of these conditions shall be the responsibility of the Subcontractor(s) working through the Contractor and the Contractor's surety. To facilitate the resolution of any problems relating to these provisions, the

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Contractor shall furnish the Subcontractor(s) with the name, address and telephone number of the Contractor's surety within ten (10) days of the date on which the Contractor signs a Contract with the Owner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 Payment by the Owner, based on an Application for Payment, or a Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 NOT USED

§ 9.7 NOT USED

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 After validating the Contractor's claim of Substantial Completion and accompanying list, the Architect will perform site inspections to verify work completion and prepare a supplemental comprehensive list of items to be completed prior to Substantial Completion and prior to final payments.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner may, at the sole discretion of the Owner, make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete, defective, not in accordance with the requirements of the Contract Documents, or unsettled claims, and shall include the cost of any third party to finish incomplete, incorrect or defective work, and compensation and expenses of the Architect and Owner for work related thereto.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may with the consent of Contractor's surety, if required, and consent of authorities having jurisdiction of the work, if required, use or occupy any portion of the work whether or not substantially complete in accord with Sections 9.8 and 2.5.1.

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§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work. The Architect shall prepare an itemized list of incomplete and defective work based on the Architect's observations and inspections of the work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled. If the work is determined not to be complete, the Owner may deduct from the Contractor's final payment the cost of all subsequent inspections by the Architect.

§ 9.10.1.1 In the event incomplete, incorrect or defective work is not completed to the Owner's satisfaction within 30 calendar days of the architect's notice to the Contractor that such Work is incomplete, incorrect or defective, the Owner must notify the Contractor per Section 2.4.1, and may complete and correct work and deduct from the final payment any and all costs incurred by the Owner in completing such Work.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner, and (6) Contractor has submitted all closeout items required by the Contract Documents, including, but not limited to, Operations & Maintenance Manuals, As-Built drawings, and properly executed Department of Revenue IC-134 forms. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

.1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;

.2 failure of the Work to comply with the requirements of the Contract Documents; or

.3 terms of special warranties required by the Contract Documents.

Init.

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.4 faulty or defective Work appearing after Substantial Completion

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

§ 9.10.6 LIQUIDATED DAMAGES

§ 9.10.6.1 If provided for in the Special Conditions within the GMP amendment or amendments, the Owner will be entitled to deduct liquidated damages from the final payment for failure of the Contractor to complete the projects by the date specified in the Contract as defined in the GMP amendment or amendments. The Contractor will be assessed a charge in the amount specified, not as a penalty, but as liquidated damages to compensate the Owner for all additional costs incurred. The contractor shall include in their GMP Proposal for each GMP amendment, the following:

.a Risk assessment of schedule delay
.b Risk Mitigation Plan to avoid a schedule delay
.c Schedule Recovery Plan

§ 9.10.6.2 The reasonableness of the charge is presumed, and the amount assessed is in addition to any other remedies available to the Owner. The charge will be assessed for each period the entire project is not suitable for use and/or occupancy measured from the Contract completion date to the date of Substantial Completion. No liquidated damages will accrue during periods of authorized delays or suspension. The charge will be as scheduled in the Special Conditions.

§ 9.10.6.3 The Owner may waive any portion of or all of the accrued liquidated damages provided (a) the project is ready for occupancy by the Owner or (b) available for the next stage construction as determined by the Owner.

§ 9.10.6.4 The Owner does not waive any rights under the Contract by the collection of liquidated damages. Liquidated damages will continue to be charged to the Contract or the Contractor's Surety in the event of Contractor default and Owner continuing or supplementing the work with its own forces or separate Contractors.

§ 9.11 PREVAILING WAGES

§ 9.11.1 Pursuant to Minnesota Statutes 177.41 to 177.44 and corresponding Minnesota Rules 5200.1000 to 5200.1120, this contract is subject to the prevailing wages as established by the Minnesota Department of Labor and Industry. Specifically, all contractors and subcontractors must pay all laborers and mechanics the established prevailing wages for work performed under the contract. Failure to comply with the aforementioned may result in civil or criminal penalties.

The prevailing hours of labor may not be more than eight hours per day or more than 40 hour per week. Pursuant to Minnesota Statutes 177.43, "No laborer or mechanic employed directly on the project work site by the Contractor or any subcontractor, agent or other person doing or contracting to do all or a part of the work of the project, is permitted or required to work more hours than the prevailing hours of labor, unless paid for all hours in excess of the prevailing hours at a rate of at least 1-1/2 times the hourly basic rate of pay; and a laborer or mechanic may not be paid a lesser rate of wages than the prevailing wage rate in the same or most similar trade or occupation in the area." Nothing in this Contract shall be construed as prohibiting the Contractor or subcontractor paying a higher negotiated wage rate. This requirement does not apply to wage rates and hours of employment of laborers or mechanics who process or manufacture materials or products or to the delivery of materials or products by or for commercial establishments which have a fixed place of business from which they regularly supply processed or manufactured materials or products. This section applies to laborers or mechanics who deliver mineral aggregate such as sand, gravel, or stone which is incorporated into the work under the contract by depositing the material substantially in place, directly or through spreaders, from the transporting vehicle.

§ 9.11.2 To facilitate compliance pursuant to the State Statutes, wage determinations (prevailing wages) were prepared for different trades for each county from which labor for said project would be secured and are included and published in the Contract Specifications. Any wage determinations that are found not to be so promulgated do not relieve the Contractor from any responsibility for paying the prevailing wage rate of the trade in question. All laborers, workers, and mechanics must be paid the prevailing wage rate for work performed on the project. If the wage

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certification or published prevailing wages do not include a rate for a classification of work used on the project, the contractor shall contact the Department of Labor and Industry to obtain a rate.

§ 9.11.3 In accordance with Minnesota Statutes 177.30 Sub. 4 and 177.43 Sub. 3, the Contractor and Subcontractor shall furnish to the Contracting Authority and the Project Owner all payrolls, of all workers on the project, via E-mail as attachments, a State of Minnesota Prevailing Wage Payroll Report as a Microsoft Excel file and Statement of Compliance Form as a PDF file to the appropriate E-mail address:

.1 for Dept. of Administration, Materials Management Division and Real Estate & Construction Services projects use PrevailingWage.PayrollForm@state.mn.us , and RECS.PrevailingWageForm@state.mn.us

.2 FOR OTHER STATE AGENCIES use the E-mail address provided in their solicitation.

The State of Minnesota Prevailing Wage Payroll Report and Statement of Compliance Form are available on the MMD website at www.mmd.admin.state.mn.us/mn02000.htm . Submit the completed and signed State of Minnesota Prevailing Wage Payroll Report as a Microsoft Excel file and the Statement of Compliance Form as a PDF file, no other payroll forms will be accepted to meet this requirement.

These completed forms must be furnished not more than 14 days after the end of each pay period.

The Subject Line on the Contractor's and Subcontractor's E-mail must show the Firm name, the Contract Number or Purchase Order Number and the pay period ending date.

Failure to maintain records as required by Minnesota Statutes 2008, Section 177.30 may be fined up to $1,000 for each failure to maintain said records. This penalty is in addition to any penalties provided under section 177.32, Subd. 1. Contractors and subcontractors must keep these records for three years after the contracting authority has made final payment on the public works project.

For questions regarding the Prevailing Wage Laws, contact the Department of Labor and Industry at 651.284.5091.

§ 9.11.4 The Contractor is solely responsible for payment of all required Prevailing Wage rates. Further, the State will not be liable for increased labor cost, errors in the rates or classifications, or changes to same prior to the awarding of Contracts. Information pertaining to the prevailing wage rates, prevailing hours of labor and hourly basic rates are included in this specification. Said wage rates must be posted in at least one conspicuous place for the employees working on the project.

§ 9.11.5 Any Contractor, subcontractor, or agent, who, after executing a contract in compliance with this section, pays to any laborer, workman, or mechanic employed directly on the project, a lesser wage for work done on the project than the prevailing wage rate, shall be subject to fine and imprisonment. This misdemeanor is punishable by a fine of not more than $700, or imprisonment for not more than 90 days, or both. Each agent or subcontractor shall furnish to the contractor evidence of compliance with this section. Each day a violation of this section continues is a separate offense.

§ 9.11.6 In accordance with Minnesota Statutes 177.43, sub. 6a, upon issuance of a notice of a compliance order and withholding order issued by the Department of labor and Industry to the Contractor of subcontractor or another employer pursuant to section 177.27, sub. 4 for violation of sections 177.41 to 177.44, the Owner, as the contracting authority shall withhold payment of sufficient sum to the prime or general contractor on the project to satisfy the back wages assessed or otherwise cure the violation, and the owner must withhold the sum ordered until the compliance order has become a final order and has been fully paid or otherwise resolved by the Contractor.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable, and legally required, precautions for safety of, and shall provide reasonable, and legally required, protection to prevent damage, injury or loss to

.1 employees on the Work and other persons who may be affected thereby;

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.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

.1 Hotworks: In addition to legally required and specified protection requirements, the Contractor is responsible for obtaining the Owner's Personnel/Property protection requirements from the facility in which the Contractor is performing the work and to implement a "hotworks" safety program during the performance of their work. Hotworks is defined as use of any equipment or tools capable of producing heat and ignition sources sufficient to start fires or ignite explosives. The local Facility Manager or Safety Director shall be informed in advance of any hotworks necessary for the project. Safety precautions may include the removal or relocation of fire hazards, the provision of guards and fire blankets, coordination and verification of sprinkler systems and a fire watch that extends a minimum of 30 minutes past the conclusion of any hotworks.

.2 Safety Program: The Contractor shall implement and provide documentation on a Safety Program such as AWAIR (A Workplace Accident Injury Reduction Act) program and:

.1 Post Emergency phone numbers and procedures at the project site.

.2 Provide and Post the Contractor's Safety Director's name and phone number

.3 Provide and Post the Contractor's on-site safety representative's name, title and phone number

.4 Conduct weekly Safety Meetings during the performance of the contract and allow owner's safety representatives to be present during the Safety Meetings.

The owner assumes no obligation or liability for safety on the project site or legal and insurance requirements involving safety.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.3.1 In the event the owner, owner's representative, or architect observe an unsafe or hazardous condition on the project site, they shall have the right, but not an obligation, to stop work until such hazard or safety condition is remedied by the contractor.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel and comply with applicable regulations, laws pertaining to the storage, handling, use, transportation of explosives, hazardous materials or equipment.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

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§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY
If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS
§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 All Contractors shall fully comply with the requirements of Minnesota Statutes, Sections 326.70 through 326.81 and Minnesota Rules, parts 4620.3000 to 4620.3700.

§ 10.3.3 Any Contractor who performs any asbestos-related work or asbestos management activity shall be licensed or certified by the Minnesota Commissioner of Health under Minnesota Statutes Sections 326.70 through 326.81, and shall perform such work or activity in accordance with rules prescribed by the Minnesota Commissioner of Health related to asbestos abatement and asbestos management activity. Without waiver of other provisions in this Article 10.3, the Contractor is not responsible for damages, costs, fines or penalties caused by the handling of pre-existing hazardous materials and substances, except to the extent of the contractor's fault or negligence in the handling of such substances.

§ 10.3.4 If there is a Contract involving existing construction, the Owner will provide to the Contractor an Asbestos Survey Report identifying the building materials containing asbestos. The Contractor shall read and understand the content of the Report and examine the site and facilities as necessary to develop a full understanding of the extent, location, quantity, and conditions of any potential asbestos containing material identified in the Report.

§ 10.3.5 Where potentially hazardous substances have been partially removed from any work area, either prior to or in conjunction with, the construction required under the asbestos abatement Contract, the Owner will provide to the Contractor a copy of the drawings, specifications, or other Documents which indicate the extent of removal work anticipated to be performed prior to the work of the Contractor. The Contractor shall review and fully understand the extent of the provided Documents and shall make appropriate inspections to ascertain that potential asbestos containing materials have been removed from affected work areas or that they have been encapsulated and will not pose a hazard to employees on the job site.

§ 10.3.6 All Contractors shall know and understand that where asbestos materials may have been partially or fully removed to facilitate the work of the Contractor, that such prior work is not a guarantee that all asbestos containing materials have been completely removed from all areas that might be affected by the work of the Contractor. The Contractor shall protect any asbestos materials that were left in place or that were not shown on the asbestos removal plans as scheduled to be removed.

§ 10.3.7 In responding for this project, the Contractor shall know and understand that it may encounter potential asbestos containing materials that may impede the progress of construction, require changes in the project schedule or changes in the sequences of work, or result in delays in completion. If such an event occurs, the Owner will grant a reasonable Contract time extension, but only if the Contractor could not reasonably have foreseen such conditions and could not reasonably adjust its project schedule to avoid any delays in completion.

§ 10.3.8 NOT USED

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§ 10.3.9 The Owner shall not be responsible under Section 10.3 for materials and substances brought to the site by the Contractor or any tier of subcontractor unless such materials or substances were required by the Contract Documents.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S INSURANCE

§ 11.1.1 The Contractor shall

(Paragraphs deleted)

not commence work under the Contract until it has obtained all the insurance required by the specifications and such insurance has been approved by the State of Minnesota, Materials Management Division. All policies and certificates shall provide that the policies shall remain in force and effect throughout the term of the contract.

§ 11.1.1.2 A Prime Contractor Controlled Insurance Program that complies with Sections 11.1.2 through Section 11.1.8.6 is acceptable.

§ 11.1.2 COMMERCIAL GENERAL LIABILITY

§ 11.1.2.1 Contractor shall maintain insurance to cover claims arising from operations under this Contract, whether such operations are by the Contractor, Subcontractor, Sub-Subcontractor or by anyone directly or indirectly employed under this Contract. Unless otherwise specified, the insurance **minimum** limits of liability shall be as follows:

$2,000,000 – Per Occurrence
$2,000,000 – Annual Aggregate applying per project or location
$2,000,000 – Annual Aggregate applying to Products and Completed Operations
$50,000 – Fire Damage (any one fire)
$5,000 – Medical Expense (any one person per occurrence)

§ 11.1.2.2 The following coverages shall be included:

- Premises and Operations Bodily Injury and Property Damage
- Personal Injury & Advertising Injury
- Products and Completed Operations Liability, to be maintained for at least 3 years after completion of the work under this contract.
- Contractual Liability as provided in ISO form CG 00 01 12 04 or its equivalent
- Pollution exclusion with standard exception as per Insurance Services Office
- (ISO) Commercial General Liability Coverage Form – CG 00 01 12 04 or equivalent
- Independent Contractors – Let or Sublet work
- Explosion, Collapse, and Underground (XCU) perils
- Broad Form PD
- Waiver of Subrogation in favor of the State of Minnesota

11.1.2.3 Contractor Pollution Legal Liability

- When project involves work or potential work with pollutants (like asbestos, etc.) or potential exposure to the same, the following insurance is required:

  The Contractor shall maintain Pollution Liability Insurance (or equivalent pollution liability coverage endorsed on another separate policy or another form of liability coverage, such as general liability or professional errors and omissions policy) and in case any work is subcontracted, the Contractor will require the subcontractor to provide Pollution Liability insurance, unless the requirement is noted as waived in the specifications for specific types of work. Unless otherwise specified the insurance minimum limits of liability shall be as follows:

  $2,000,000 – Per Occurrence
  $2,000,000 – Annual Aggregate

  The following coverage's shall be included:

  - Policy will include non-owned disposal site Pollution Liability if transporting pollutants.

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- Policy will not contain a lead exclusion.
- Waiver of subrogation in favor of the State of Minnesota.

Coverage shall be in accordance with Section 11.1.2.3.

§ 11.1.2.3 Officers and Employees of the State of Minnesota, the Architect and its agents shall be named as Additional Insureds, by endorsement, ISO Forms CG 20 10 and CG 20 37 or their equivalent for claims arising out of the Contractor's negligence or the negligence of those for whom the Contractor is responsible.

§ 11.1.3 BUSINESS AUTOMOBILE LIABILITY

§ 11.1.3.1 Contractor shall maintain insurance to cover liability arising out of the operations, use, or maintenance of all owned, non-owned and hired vehicles. Unless otherwise specified, the insurance **minimum** limits shall be as follows:

$2,000,000 – Per Occurrence combined Single Limit Bodily Injury and Property Damage.

§ 11.1.3.2 The following coverages shall be included:

- Owned Automobiles
- Hired Automobiles
- Non-owned Automobiles
- Waiver of subrogation in favor of the State of Minnesota

§ 11.1.4 PROFESSIONAL LIABILITY – DESIGN ERRORS AND OMISSIONS

§ 11.1.4.1 If the Owner specifies that the Contractor provide design and related services and, pursuant to Section 3.12.10, the Contractor provides such services with its employees, the Contractor shall maintain insurance covering negligent acts, errors or omissions, arising out of the performance of, or the failure to perform, such professional services included in the Contract Documents. Additionally, the Contractor shall require its Architectural and Engineering consultants and their subconsultants, if any, to maintain professional liability insurance. All such insurance shall be maintained for a minimum of five (5) years, if commercially available, otherwise a minimum of three (3) years following completion or earlier termination of the Project. Unless otherwise specified, the insurance minimum shall be as follows:

§ 11.1.4.2 Minimum limit of liability of $2,000,000 per claim and $2,000,000 annual aggregate. Any deductible will be the sole responsibility of the Contractor and may not exceed $50,000 without the written approval of the Owner.

§ 11.1.4.3 If the policy is claims made, it shall contain the following language:

Prior acts or retroactive date of coverage shall not be subsequent to the effective date of this Contract and Contractor shall maintain such insurance for a period of at least five (5) years, if commercially available, otherwise a minimum period of three (3) years, following completion or earlier termination of the Project. If such insurance is discontinued, extended reporting period coverage must be obtained to fulfill this requirement.

Evidence of insurance shall be filed with the Owner prior to start of design services if they are to be provided.

§ 11.1.5 WORKERS' COMPENSATION

§ 11.1.5.1 Contractor shall provide workers' compensation insurance for all employees and shall require any Subcontractor to provide workers' compensation insurance in accordance with the statutory requirements of the State of Minnesota and must include:

a. Part 2, Employers Liability including Stop Gap Liability for monopolistic states, at limits of not less than:
   - $100,000 – Bodily Injury by disease per employee
   - $500,000 – Bodily Injury by disease aggregate
   - $100,000 – Bodily Injury by accident

b. Coverage C: All States Coverage

c. If applicable, USL&H, Maritime, Voluntary and Foreign Coverage.

d. A waiver of subrogation in favor of the State of Minnesota, as Owner.

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§ 11.1.5.2 If Contractor is self-insured for its obligation under the Workers' Compensation Statutes in the jurisdiction where the project is located, a Certification of the Authority to Self-Insure such obligations shall be provided.

Evidence of Subcontractor insurance shall be filed with the Contractor.

§ 11.1.6 AVIATION AND/OR MARINE PUBLIC LIABILITY

§ 11.1.6.1 Should aircraft or watercraft of any kind be used by the Contractor, any tier of Subcontractor or by anyone else on their behalf, Contractor or Subcontractor shall maintain or cause the operator of the aircraft/watercraft to maintain aircraft/watercraft public liability insurance including bodily injury, property damage and passenger liability, as respects any aircraft/watercraft owned, used, operated or hired in connection with the work by the Contractor, Subcontractor or anyone else in the following limits:

§ 11.1.6.2 Aircraft/ Watercraft Liability - $10,000,000 Per Occurrence combined Single Limit Bodily Injury and Property Damage.

Evidence of insurance shall be filed with the Owner prior to use of equipment on project.

§ 11.1.7 UMBRELLA OR EXCESS LIABILITY

§ 11.1.7.1 The Contractor shall provide Umbrella or Excess Liability Insurance with limits of not less than $10,000,000 per occurrence and $10,000,000 aggregate and with coverage at least as broad as the primary coverages of Commercial General Liability, Employer's Liability and Automobile Liability set forth in Article 11 or use Umbrella or Excess Liability Insurance to supplement the primary policy limits to satisfy the full policy limits required by the Contract. An Umbrella or Excess Liability insurance policy may be used to supplement the Contractor's policy limit to satisfy the full policy limits required by the contract.

§ 11.1.8 ADDITIONAL INSURANCE CONDITIONS

§ 11.1.8.1 Primary and Non-Contributory - Contractor's policy(ies) shall be primary and non-contributory insurance to any other valid and collectible insurance available to the State of Minnesota or self-insurance maintained by the State of Minnesota with respect to any claim arising out of this Contract.

§ 11.1.8.2 Contractor is responsible for payment of contract related insurance premiums and deductibles.

§ 11.1.8.3 Insurance Companies must either (1) have an AM Best rating of A- (minus) and a Financial Size Category of VII or better, and be authorized to do business in the State of Minnesota or (2) be domiciled in the State of Minnesota and have a Certificate of Authority/Compliance from the Minnesota Department of Commerce if they are not rated by AM Best.

§ 11.1.8.4 Insurance Companies waive their rights to assert the immunity of the State as a defense to any claims arising out of this Contract.

§ 11.1.8.5 The above establishes minimum insurance requirements. It is the sole responsibility of the Contractor to determine the need for and to procure additional insurance that may be needed in connection with this contract.

§ 11.1.8.6 Certificates of Insurance acceptable to the State of Minnesota shall be submitted prior to commencement of the work under this contract. If the Contractor receives a cancellation notice from an insurance carrier affording coverage herein, the Contractor agrees to notify the State of Minnesota within five (5) business days with a copy of the cancellation notice, unless the Contractor's policy(ies) contain a provision that coverage afforded under the policy(ies) will not be canceled without at least thirty (30) days advance written notice to the State of Minnesota.

§ 11.2 Owner's Liability Insurance: The Owner will be responsible for maintaining its own liability insurance or self insurance program and, at its option, may purchase and maintain such insurance as will protect the Owner against claims which may arise from operations under the Contract.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 BUILDER'S RISK – BY OWNER

The Owner shall be responsible for providing and maintaining "All Risk" or equivalent Builder's Risk policy insuring

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the interest of the Owner, Contractor, and any tier of Subcontractor. Coverage on an "All Risk" or equivalent basis shall include the perils of flood, earthquake and pollution cleanup expense. The contractor's deductable amount and terms of the Owner's risk will be incorporated into the GMP Amendment.

(Paragraphs deleted)

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 Unless otherwise exempted in these Contract Documents, the Contractor shall furnish a Performance Bond and a Labor and Material Payment Bond (individually a "Bond" and collectively "Bonds") to the Owner. The Performance Bond shall be in an amount equal to 100% of the full amount of the Contract sum as security for the faithful performance of the Contract, and the Labor and Material Payment Bond shall be in an amount equal to 100% of the full amount of the Contract sum as security for the payment of all persons performing labor and furnishing materials in connection with the Contract Documents. Such Bonds shall be on forms approved by or provided by the Owner and shall name the Owner as primary Obligee.

§ 11.4.2 The surety issuing the Bonds shall be satisfactory to the Owner, be licensed to issue Bonds in the State of Minnesota, shall be rated by A.M. Best an A-(minus) or better, and shall be within the limit set by the Treasury Department as the net limit on any single risk for the surety, or if co-sureties are utilized, the amount of each Bond shall be within the total of such limits set for a surety and any such co-sureties. There shall be no affiliation between the Contractor and any bonding agencies or agent used.

§ 11.4.3 In the event of change orders that result in an increase in the Contract Sum, the penal sum of each Bond shall increase in the amount of such change in the Contract sum without obtaining the surety's consent up to a maximum of 10% of the penal sum. Any aggregate increase in the excess of 10% of the original penal sum shall require the surety's written consent. The Contractor shall be responsible for getting the consent, and shall submit a copy of such consent to the Owner.

§ 11.4.4 If the Owner determines that the surety providing the bonds no longer meets the requirements of Section 11.4.2, the Contractor shall obtain an adequate replacement surety that will provide acceptable bonds in the same form and amount as the bonds issued by the original surety. The Contractor shall pay the premium(s) on such new Bond(s). The Contractor acknowledges that further payments to the Contractor may not be made until the new surety has been qualified and approved.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense. The costs of corrections include labor, material, equipment, safety precautions in accordance with the Contract Documents.

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§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties or special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4. Notice of discovery and required correction may be given by either the Owner or the Architect.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed and accepted after Substantial Completion by the period of time between Substantial Completion and the actual completion and acceptance of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.2.6 The Contract Documents survive final payment and are applicable to the performance of all corrective work required, regardless of time.

§ 12.2.7 The obligation of the Contactor to perform corrective work shall survive final completion of the work and final payment under the Contract.

§ 12.2.8 The Owner does not waive any remedies for the cost of performing corrective work the Contractor neglects or refuses to perform in a timely manner.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made. If the Owner chooses to accept nonconforming work pursuant to this provision, then the Contractor shall warrant the accepted work for the period stated in Section 12.2 as amended. The adjusted Contract Sum, when determined after final payment, shall be reimbursed to the Owner by the Contractor.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The laws of the State of Minnesota shall govern the Contract and the venue for any claims or actions shall be Ramsey County, Minnesota.

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§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 NOT USED

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice. Normal communication between parties may be by US Mail, email or fax.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.1.1 The requirements of 13.5.1 may be superseded by the project General Requirements, and by project specifications providing for the Owner to obtain and pay for specific testing and special inspections. Tests and inspections otherwise required by codes, laws, ordinances, rules or regulations of any authority having jurisdiction over the project shall be provided and paid for by the Contractor using entities acceptable to said authority. The Contractor shall schedule all tests and inspections with the providing party so as not to delay the project.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

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§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 NOT USED

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

§ 13.8 ASSIGNMENT OF ANTITRUST CLAIMS

§ 13.8.1 The Contractor hereby assigns to the State of Minnesota any and all claims for overcharges as to goods and materials purchased in connection with this order or Contract resulting from antitrust violations which arise under the antitrust laws of the State of Minnesota. In addition, Contractor warrants and represents that each of their first tier suppliers and Subcontractors shall assign any and all such claims to the State of Minnesota. By signing the Solicitation, the Contractor agrees with the following statement:

.1 I/We certify that we have not, either directly or indirectly, entered into any agreement or participated in any collusion or otherwise taken any action in restraint of free competition; that no attempt has been made to induce any other person or firm to submit or not to submit a solicitation response; that this solicitation response has been independently arrived at without collusion with any other vendor, competitor, or potential competitor; that this solicitation response has not been knowingly disclosed prior to the opening of solicitation responses of any other vendor or competitor; and that the above statement is accurate under penalty of perjury.

§ 13.9 RECYCLING

§ 13.9.1 In accord with the State of Minnesota's sustainability guidelines, it is in the best interest of the State that scrap, waste and demolished materials be recycled. All Contractors, to the extent commercially available, are required to recycle recyclable scrap materials generated on State of Minnesota building projects. A recycling plan may be required by the General Requirements and Specifications. If the Owner discovers that the Contractor is not utilizing commercially available recycling the project may be stopped until recycling provisions are implemented by the Contractor. When waste and demolished materials contain or are suspected of containing legally defined hazardous compounds, legal and proper disposal by qualified and licensed personnel is required.

§ 13.10 RECORDS

§ 13.10.1 The books, records, documents, bid preparation documents, and accounting procedures and practices of the Contractor and its employees, agent, or subcontractors relevant to the Contract must be made available to and subject to examination by the Owner, Legislative Auditor and/or the State Auditor for a minimum of six years after the end of the contract. The Contractor shall maintain all documentation, at its expense, in the event of a claim giving rise to a litigation hold order.

§ 13.11 GOVERNMENT DATA PRACTICES ACT

§ 13.11.1 The Contractor and the Owner must comply with the Minnesota Government Data Practices Act, Minn. Statute Ch 13, as it applies to all data provided by the Owner, and as it applies to all data created collected, received, stored, used, maintained or disseminated by the Contractor under this Contract. The civil remedies of Minn. Statute 13.08 apply to the release of all data by either the Contractor or the Owner.

§ 13.11.2 If the Contractor receives a request to release data, the Contractor must immediately notify the Owner before releasing any data. The Owner will give the Contractor instructions concerning the release of the data to the requesting party.

§ 13.13 LABOR AND WAGES NONDESCRIMINATION

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§ 13.13.1 The Contract shall conform with and agree to provisions of Minnesota Statutes section 181.59 that prohibits discrimination in the hiring of labor by reason of race, creed or color, which section is reproduced below:

§ 13.13.2 181.59 DISCRIMINATION ON ACCOUNT OF RACE, CREED, OR COLOR PROHIBITED IN CONTRACT. Every contract for or on behalf of the State of Minnesota, or any county, city, town, township, school, school district, or any other district in the State, for materials, supplies or construction shall contain provisions by which the Contractor agrees:

.1 That, in hiring of common or skilled labor for the performance of any work under any Contract, or any subcontract, no Contractor, Material Supplier, or Vendor shall, by reason of race, creed, or color discriminate against the person or persons who are citizens of the United States or resident aliens who are qualified and available to perform the work to which the employment relates;

.2 That no Contractor, Material Supplier, or Vendor shall, in any manner, discriminate against or intimidate, or prevent the employment of any person or persons identified in the clause (1) of this section, or on being hired, prevent, or conspire to prevent, the person or persons from the performance of work under any Contract on account of race, creed, or color;

.3 That a violation of this Section is a misdemeanor; and

.4 That this Contract may be canceled or terminated by the State, county, city, town, school board, or any other person authorized to grant the Contracts for employment, and all money due, or to become due under the contract, may be forfeited for a second or any subsequent violation of the terms and conditions of this Contract.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.3 **NOT USED**

.4 **NOT USED**

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 NOT USED

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials; or

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors; or

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents; or

.5 files a bankruptcy petition or has a bankruptcy action commenced against it that is not discharged within 30 days of commencement of same, makes an assignment for the benefit of its creditors, has a receiver appointed to manage the Contractor's assets or otherwise is becoming insolvent; or

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.6 materially fails to comply with interim or final completion dates as required by the Contract Documents, or materially fails to comply with design requirements of the Contract Documents, or persistently fails to perform the work in accordance with the Contract Documents.

.7 fails to maintain the required insurance.

§ 14.2.2 When any of the above reasons exist, the Owner, may by giving the Contractor and the Contractor's surety, if any, written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum the direct and indirect consequential costs of completing the Work, including but not limited to fees and charges of Architects, Engineers, Attorneys, other professionals and court costs,, and other damages incurred by the Owner, such excess will be paid to the Contractor. If such costs and damages exceed such unpaid balance, the Contractor shall pay the difference to the Owner. Such costs incurred by the Owner will be approved as to reasonableness by the Owner, but when exercising any rights or remedies under this article, the Owner shall not be required to obtain the lowest price for the work performed. This obligation for payment shall survive termination of the Contract, final completion of work and final payment.

§14.2.5 If a court determines that the termination was not supported by at least one of the reasons stated in Section 14.2.1, the termination shall be deemed a termination for the Owner's convenience and be governed by Section 14.4.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall not include profit. No adjustment shall be made to the extent

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination. The Contractor may not recover Overhead and Profit for Work not performed.

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ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, extension of time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. Arbitration and Mediation, mandated or otherwise required, as a method of dispute and/or claim resolution, wherever referenced in Article 15, do not apply to this Contract or any Contract with the State of Minnesota. This Article 15 is modified to exclude all references to arbitration and mediation and to substitute the following:

The Contractor and the State may exercise those legal remedies in District Court as may be available to them in connection with any dispute arising out of this agreement which cannot be settled by the parties.

In case any question, dispute or controversy arises between the Contractor and Owner, or Contractors separately employed by the State, such dispute or controversy shall be referred to the Commissioner of Administration or the Commissioner of Administration's designee.

The venue of any proceedings is herein agreed to be Ramsey County, State of Minnesota, unless otherwise specifically agreed.

The Contractor shall carry on the work and maintain the progress schedule during any proceedings or disputes, unless otherwise instructed by the Owner in writing.

§ 15.1.2 NOTICE OF CLAIMS

Claims by the Contractor must be initiated by written notice to the Owner with a copy sent to the Architect. Claims must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the Contractor first recognizes the condition giving rise to the Claim, whichever is later. For purposes of this section, communication regarding contractor's claims may be communicated by the Owner, Architect, Owner's Representative or other agent of the Owner acting on behalf of the owner.

Claims not initiated by the contractor within 21 days after occurrence of the event giving rise to such claim or within 21 days after the contractor first recognizes the condition giving rise to the claim are waived.

.1 A Notice of Claim is not an "invoice" or application for payment for the purposes of Section 15.1.2 nor for purposes of Minnesota Statutes Section 16A.124.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Owner.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction, in accordance with Section 8.3.2.4.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

(Paragraphs deleted)

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Waiver of Consequential Damages is NOT USED. Consequential damages will not be claimed by the owner as a remedy for recovery of owner's damages related to a delay in the contractor's completion of the work when liquidated damages for a delay are incorporated into the GMP amendment or amendments as the remedy for owner's damages.

§ 15.1.7 CLAIMS FOR CONCEALED OR UNKNOWN CONDITIONS

If conditions are encountered at the site which are (1) subsurface or otherwise fully concealed physical conditions which differ materially from those affirmatively indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that could not have been anticipated and which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents (3) are not observable prior to bidding or inferable by the type of construction, then notice by the observing party shall be given to the other party promptly before conditions are disturbed and in no event later than 21 days after first observance of the conditions. If notice is not given by the Contractor within 21 days after first observance of the condition, all claims by the contractor that arise from the condition are waived. The Architect will promptly investigate such conditions and, if they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall so notify the Owner and Contractor in writing, stating the reasons. Claims by either party in opposition to such determination must be made within 21 days after the Architect has given notice of the decision. If the conditions encountered are materially different, the Contract Sum and Contract Time shall be equitably adjusted, but if the Owner and Contractor cannot agree on an adjustment in the Contract Sum or Contract Time, the adjustment shall be referred to the Architect for initial determination, subject to further proceedings pursuant to Section 15.2.

§ 15.2 RESOLUTION OF CLAIMS AND DISPUTES

§ 15.2.1 Claims, disputes and other matters in question between the Contractor and the Owner relating to the execution or progress of the work or interpretation of the Contract Documents, along with supporting documents, shall be referred initially to the Architect for decision which the Architect will render in writing within a reasonable time. The Contractor shall promptly furnish all information requested by the Architect so the Architect can make an informed decision. The Architect's decision shall be binding but does not abridge any legal remedies afforded the parties under the Contract Sections 15.2.9 and 15.2.10.

§ 15.2.2 NOT USED

§ 15.2.3 NOT USED

§ 15.2.4 NOT USED

§ 15.2.5 NOT USED

§ 15.2.6 NOT USED

§ 15.2.6.1 NOT USED

§ 15.2.7 NOT USED

§ 15.2.8 NOT USED

§ 15.2.9 Arbitration and Mediation as a method of dispute resolution, wherever referenced in Article 15 or elsewhere in the Contract Documents, do not apply to this Contract. Any unresolved issue, dispute or controversy arising between the Contractor and Owner, Architects, or Contractors separately employed by the Owner shall first be referred to the Commissioner of Administration or its designated representative

§ 15.2.10 The Contractor and Owner may exercise those legal remedies in District Court as may be available to them in connection with any dispute arising out of this agreement which cannot be settled by the parties subject to the conditions in Section 13.7.

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The venue of any proceedings shall be Ramsey County, State of Minnesota, unless otherwise agreed in writing.

The Contractor and Subcontractors shall carry on the work and maintain the progress schedule during any proceedings, unless otherwise instructed by the Owner in writing.

§ 15.3 MEDIATION – NOT USED
§ 15.3.1 NOT USED

§ 15.3.2 NOT USED

§ 15.3.3 NOT USED

§ 15.4 ARBITRATION - NOT USED
§ 15.4.1 NOT USED

§ 15.4.1.1 NOT USED

§ 15.4.2 NOT USED

§ 15.4.3 NOT USED

§ 15.4.4 CONSOLIDATION OR JOINDER - NOT USED
§ 15.4.4.1 NOT USED

§ 15.4.4.2 NOT USED

§ 15.4.4.3 NOT USED

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SECTION 00 73 00
SPECIFIC PROJECT REQUIREMENTS

1. GENERAL

1.1. All work required by these Specific Project Requirements shall be included in the Subcontract Documents. In case of conflicts between the Specific Project Requirements and other Subcontract Documents, the more stringent requirements shall govern as determined and directed by the Contractor.

1.2. Subcontractor will be required to attend preconstruction meetings, progress meetings and other meetings to review the Project. Items to be discussed during the progress meetings shall include, but are not limited to, schedule, safety, coordination issues, quality, security, RFI's, changes to the work etc as set forth below.

2. WORK HOURS

2.1. Normal working hours on the project are Monday through Friday, 7:30 a.m. to 4:00 p.m. Contractor has the right to amend work hours as required or necessary to maintain project schedule or as seasonal and/or site work conditions warrant.

3. ELECTRONIC PROJECT CORRESPONDENCE AND COMMUNICATION

3.1. Project communications and correspondence will occur electronically. This will include all project correspondence, meeting minutes, change documents, schedules, payment applications, submittals, etc.

3.2. Subcontractors will be required to have internet access and to maintain an email address (of sufficient file size to receive drawings and .pdf files) for the purpose of managing communication and documents during the construction stage.

3.3. **A Project Web site administered by the Contractor will be used for purposes of managing communication and documents during the construction stage. Subcontractors will be given access to this site and are expected to submit all project paperwork through a folder provided specifically for their company. Paperwork to be submitted through the website includes, but is not limited to: Payment Applications, Compliant Insurance Certificates, DCIP Enrollment Forms, Supplier Letters, Subcontractor and Supplier Partial (and Final) Waiver and Affidavit, EEO/Project Labor Goal Reports, Prevailing Wage Reporting, Submittals, and Pricing.**

4. BUILDING INFORMATION AND OTHER ELECTRONIC DATA

4.1. The Architect and Contractor may utilize and provide the Subcontractor Building Information Modeling or other electronic data ("Electronic Data") for use in the Subcontractor's work during the course of the Project.

4.2. The Electronic Data will be provided for informational purposes only. Subcontractor cannot not use or attempt to use the Electronic Data for any other project or purpose other than in connection with this Project.

4.3. The Electronic Data shall not replace or supersede the record hard copy set of the drawings and other Subcontract Documents ("Paper Documents"). In the event of a conflict between the Paper Documents and the Electronic Data, the Paper Documents shall govern.

4.4. Prior to receiving any Electronic Data, Subcontract will be required to complete and execute the Release required by the Architect.

4.5. Subcontractor shall pay any fees for electronic files as defined in other Sections.

5. SUBMITTALS

5.1. Refer to Division 01, Section "Submittal Procedure" for Specific Contract Requirements Regarding Submittals.

5.2. Subcontractors are to submit all Shop Drawings, Product Data and Samples ("Submittals") to the Contractor bearing the Subcontractor's stamp indicating conformance to the Subcontract Documents and shall be signed by Subcontractor's representative.

5.3. Subcontractor is to submit the following to the Contractor:

5.3.1. Shop Drawings - in PDF format via electronic files.

5.3.2. Product Data - in PDF format via electronic files.

5.3.3. Samples - 3 each of each differing type.

5.3.4. Coordination Drawings - in PDF format via electronic files.

5.4. Contractor will return to the subcontractor:

5.4.1. Shop Drawings - in PDF format via electronic files.

5.4.2. Product Data - in PDF format via electronic files.

5.4.3. Samples - 1 each of each differing type.

5.5. Subcontractor is required to forward Submittals to Contractor in a timely fashion for Contractor and Architect's review so as to maintain the Project Schedule. If a Submittal requires expediting to maintain the Project Schedule, a return date needs to be so noted on the transmittal.

5.6. Subcontractor is to forward all Submittals and Shop Drawings in electronic format – hard copies will not be accepted. Samples are to be clearly marked indicating appropriate information. All Submittals forwarded to Contractor are to be accompanied by a transmittal form/letter indicating quantity and description of information provided.

6. RECORD DOCUMENTS

6.1. Refer to Division 01, Section "Submittal Procedures" for Specific Contract Requirements regarding Submittals.

6.2. The Subcontractor is required to maintain at the Project site for the Contractor's and Owner's review current versions of the following:

- Drawings
- Specifications
- Addenda
- Change Orders
- Other Change Directives
- Approved Shop Drawings, Product Data and Samples
- Field Test Reports
- Meeting Notes

6.3. Subcontractors will provide electronic redline drawings, specifications, submittals, etc. with "As-Built" information and return to the Contractor via CD or in PDF format via electronic files when the Subcontractor is substantially complete with its work.

7. PAYMENT PROCEDURES

7.1. Refer to Division 01, Section "Payment Procedures" for specific contract requirements regarding Payment Procedures.

7.2. Schedule of Values

7.2.1. The Subcontractor will submit to the Contractor a Schedule of Values that includes all major categories of its work. Dollar amounts are to include all labor, material, overhead and profit applicable to each item in the breakdown. Submit an electronic project Schedule of Values on an AIA Form G703 - Application and Certificate of Payment Continuation Sheet.

7.2.2. Submit an electronic Schedule of Values within [seven (7) calendar days] after the date established in Notice of Award. The Schedule of Values shall list the installed value of the component parts of the work, broken down in sufficient detail to serve as a basis for computing values for progress payments during construction. The Schedule of Values should be broken down by area, building, floor, etc. in sufficient detail to evaluate progress payments. No payments will be processed prior to receipt of an approved Schedule of Values.

7.2.3. Add approved Change Orders to the electronic Schedule of Values for submission with each Application for Payment. List Change Orders in numerical sequence with a brief description of the change, with a reference to Contractor's Change Order No.

7.2.4. No progress payments will be made until the electronic Schedule of Values has been received, reviewed and approved by the Contractor. The costs assigned to the breakdown are to total the Subcontract Sum. The approved Schedule of Values is to be used by the Subcontractor on all Applications for Payment.

7.3. Application for Progress Payments

7.3.1. At a time consistent with the requirements of this section and the Subcontract Documents, and for each calendar month during the progress of the Work, the Subcontractor shall submit a properly notarized itemized Application for Payment prepared in a manner consistent with the Schedule of Values.

7.3.2. The amount shown on the Application for Payment shall be established by adding the value of work completed through the last day of the application period based upon the Subcontractor's estimate of labor and materials to be incorporated in the Work by that date, and the value of the material/equipment suitably stored in accordance with the Subcontract Documents, less the aggregate of previous payments, and less the retainage as specified in the Subcontract.

7.3.3. The form of application for payment shall be the AIA Document G702, "Application and Certificate for Payment", supported by AIA Document G703, "Continuation Sheet".

7.3.3.1. Application Form. To sufficiently complete this form, the Subcontractor shall:

7.3.3.1.1. Fill in all required information, including that for change orders executed prior to the date of submittal application.

7.3.3.1.2. Fill in the summary of dollar values to agree with the respective totals indicated on the continuation sheet.

7.3.3.1.3. Execute certificate with the signature of a responsible officer of the contractor's firm.

7.3.3.2. Continuation Sheets. To sufficiently complete this form, the Subcontractor shall:

7.3.3.2.1. Fill in total list of all scheduled component items of work, with each number and the scheduled dollar value of each item.

7.3.3.2.2. Fill in the dollar value in each column for each scheduled line item when work has been performed or products stored. Round off values to nearest dollar, or as specified in the Schedule of Values.

7.3.3.2.3. List each change order executed prior to the date of submission, at the end of the continuation sheets. List by change order number, proceed order no., description, and breakdown of costs as for an original component item of work.

7.3.4. Substantiating Data for Progress Payments

7.3.4.1. Substantiating data is required to verify a payment request. Subcontractors are to include a cover letter identifying the:

7.3.4.1.1. Project.

7.3.4.1.2. Application number and date.

7.3.4.1.3. Detailed list of enclosures.

7.3.4.1.4. In order to bill for stored materials, Subcontract is required to provide certain documentation and adhere to specific procedures as follows:

7.3.4.1.4.1. Subcontractor shall mark and identify the subject materials and/or equipment and shall segregate from and shall not commingle such goods with other goods held by the Subcontractor.

7.3.4.1.4.2. Subcontractor shall submit evidence of insurance coverage on the material and/or equipment while stored at its warehouse or other approved facilities, naming Contractor and the Owner as Additional Insureds.

7.3.4.1.4.3. Subcontractor shall complete and submit a Bill of Sale form endorsed by a corporate officer or owner. The validity of the Bill of Sale is subject to Subcontractor's receipt of payment as referred to therein. A copy of the Bill of Sale is included in Section 00 62 00.

7.3.4.1.4.4. Subcontractor shall complete and submit a Non-negotiable Bailment Receipt. A copy of the approved Non-negotiable Bailment Receipt is included in Section 00 62 00.

7.3.4.2. Submit one copy of the data cover letter for each of the applications.

7.3.4.3. Applications for Payment shall be accompanied by cost breakdowns from the sub-subcontractors, the previous billing month's waivers from the sub-subcontractors and Material Suppliers, as applicable.

7.3.4.4. When the Contractor finds the application properly completed and correct, it will transmit two (2) Certificates for Payment to the Architect to be certified for payment.

7.3.4.5. Payment Application Documents:

- Cover Letter
- G702 and G703
- Subcontractor And Supplier Partial Waiver And Affidavit
- Non-negotiable Bailment Receipt (if stored material is being billed)
- Bill of Sale (if stored material is being billed)
- Evidence of Insurance covering the stored material

7.4. Application for Final Payment

7.4.1. Submit final Application for Payment following the procedures specified above for progress payments as set forth in the Subcontract Documents.

7.4.2. Before submitting a final Application for Payment, the Subcontractor will be required to forward to the Contractor for submittal to the Architect, the written warranties and guarantees, Record and Information Manuals, and other documents required by the Contract (or Subcontract) Documents, and placed properly in approved storage at the site the extra stock and spare parts specified. Subcontractor will obtain the signature of the Contractor verifying receipt of the extra stock and spare parts.

7.4.3. Properly executed "Subcontractor And Supplier Final Waiver And Affidavit" shall be submitted to the Contractor in duplicate prior to final payment.

8. CHANGES AND/OR CLARIFICATIONS

8.1. No work shall proceed without proper Owner authorization and no work shall be paid for without executed amendments.

8.2. Request for Information (RFI)

8.2.1. If during the construction of the Project, clarification of the documents is required, it shall be brought to the attention of the Contractor. (Refer to Division 01, Section "Project Management and Coordination" for specific Contract requirements regarding RFI's.)

8.2.2. The Contractor will either provide clarification or forward a Request for Information (RFI) to the Architect. These RFI's shall be dated and sequentially numbered. The Architect shall provide its written response to the RFI and return to the Contractor for distribution to all affected subcontractors or suppliers.

8.2.3. If the RFI requires additional compensation, a response to an RFI is not an authorization to proceed with work. If additional compensation is required, the Subcontractor shall immediately advise the Contractor who will review the item with the Architect and Owner to determine if a Proposal Request will be issued.

8.3. Minor Changes in the Work

8.3.1. Refer to Division 01 Section "Contract Modification Procedures" for specific Contract requirements regarding minor changes in the Work. Prior to proceeding with any work described in an Architect's Supplemental Instructions (ASI), the Subcontractors, or Suppliers shall confirm that these will not impact the cost or schedule. Proceeding with such work without confirmation will be deemed a waiver of Subcontractor's or Supplier's right to claim additional cost or time associated with the Minor Change in Work.

8.4. Proposal Request (PR)

8.4.1. Should the Owner contemplate making a change in the work, the Architect will issue a Proposal Request (PR) to the Contractor. (Refer to Division 01, Section "Contract Modification Procedures" for specific Contract requirements regarding Proposal Requests.)

8.4.2. All PR's will be reviewed and forwarded to the affected Subcontractors and Suppliers for review. Each Subcontractor will determine if the PR affects its Scope of Work. If the described change impacts cost and/or time, the Subcontractor or Supplier shall immediately prepare a proposal for submission to the Contractor. The Subcontractor's proposal shall be broken down completely so as to identify all quantities and associated unit costs (both adds and deducts). The Contractor will review the pricing with the Owner and Architect to determine if a change order will be issued. Subcontractors are not to proceed with additional work until written authorization has been received.

8.5. Change Orders (CO)

8.5.1. If the Owner determines that a Proposal Request will be accepted, the Architect will prepare a Change Order (CO) which will be dated and numbered sequentially. (Refer to Division 01, Section "Contract Modification Procedures" for specific Contract requirements regarding Change Orders.)

8.5.2. The Change Order will describe the change or changes, will refer to the Proposal Request and proposal number, and will be signed by the Owner, the Architect and the Contractor.

8.6. Construction Change Directives (CCD)

8.6.1. Refer to Division 01, Section "Contract Modification Procedures" and other Subcontract Documents for specific Contract requirements regarding Construction Change Directives (CCD). Construction Change Directive instructs the Contractor to proceed with a change in the work prior to concluding Contract adjustment negotiations.

8.7. Submission Of Proposals For Change Order - Follow other Contract Document requirements if more stringent than the requirements listed in this section.

8.7.1. Labor Rate Breakdown:

8.7.1.1. Base Rate Calculation: All Subcontractors will be required to substantiate all labor rates (for all skill levels and tradesmen) as actual cost plus allowable overhead and profit, prior to submitting change order pricing. Breakdowns shall include: base labor rate, fringes, union dues, payroll taxes and insurance. Any item not falling into one of these categories will be considered overhead and shall be included in the fee limits listed below.

8.7.1.2. Premium on Overtime Rate Calculation: In the event overtime work is requested by the Contractor (not required by the Contract Documents or due to the fault of the Subcontractor), the premium on the overtime rate will be required to be substantiated as actual cost plus allowable overhead and profit. Breakdowns shall include: half of base labor rate, only the overtime premium portion of any applicable union fringes, and payroll taxes and insurance (excluding workers compensation insurance which is not paid on the premium portion of overtime). Any item not falling into one of these categories will be considered overhead and shall be included in the fee limits listed below.

8.7.2. Method of Proposal:

8.7.2.1. Comply with the requirements of this section and all other contract requirements.

8.7.2.2. Include a direct reference to the change document in the proposal description. If the request is not linked to a change document, a full and thorough description of the work and the reason for the change order request is required. Change requests not in this format will not be reviewed.

8.7.2.3. 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.

8.7.2.4. Indicate applicable taxes, delivery charges, equipment rental (rates and hours), and amounts of trade discounts.

8.7.2.5. Include costs of labor and supervision (as allowed by contract provisions) directly attributable to the change. Provide crew information including, labor rate for each skill level and trade, number of man-hours including estimating program back-up substantiating those hours.

8.7.2.6. Provide proposal detail and estimate which defines the type or area of work (i.e. Concrete: concrete walls, grade beams, piers, sidewalks, etc., Drywall: metal studs, rock, finishing, etc.).

8.7.2.7. Include substantiating back-up from second tier Subcontractors and Material Suppliers equal to the requirements of the Subcontractor proposal as described in this section.

8.7.2.8. Include all fee itemized separate from the detail described herein and in the limits described in this section.

8.7.2.9. Include an updated Subcontractor'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.

8.7.2.10. Review and approval of a Subcontractors proposal for change order does not alleviate Subcontractors responsibility to provide accurate estimating, i.e. acceptance of pricing does not constitute acceptance of quantities, unit prices, man-hours, etc.

8.7.3. Fee Limits:

8.7.3.1. Fee includes all general requirements, all supervision (including project management and general on site supervision), overhead and profit. Fee is to be included after all changes are subtotaled and is not allowed to be included in labor rates.

8.7.3.2. The following fee percentages shall be used for lump sum pricing and actual cost pricing of additions and deletions to the work:

Description of Condition	Not to Exceed
To Subcontractor for work performed by own forces	10%
To Subcontractor for work performed by other than own forces	5%
To second tier Subcontractor/Material Supplier for work performed by Subcontractor's own forces	10%
To second tier Subcontractor for work performed by other than Subcontractor's own forces	5%

8.7.4. Pricing Validation: If the Work associated with a Subcontractor requested change order is performed, and in the opinion of the Owner, Architect, or Contractor, the Work does not adequately reflect the breakdown provided during pricing of the change, the Subcontractor may be asked and shall be required to substantiate man-hours, equipment, quantity, etc, to validate the change order pricing.

9. PROJECT MEETINGS

9.1. Preconstruction Conference

9.1.1. Contractor will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect.

9.1.1.1. The conference will be conducted to review responsibilities and personnel assignments.

9.1.1.2. Authorized representatives of Owner, Contractor, Architect, and their consultants; Subcontractor(s) and their superintendent; major sub-subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

9.1.1.3. Contractor will discuss items of significance such as administrative items, procedural issues, site usage and requirements, schedule, jobsite rules and regulations, etc.

9.2. Progress Meetings

9.2.1. Progress Meetings, chaired by the Contractor, will be held regularly, on a weekly or bi-weekly basis as required to support the schedule. Attendance by the Subcontractor's onsite superintendent will be mandatory; however, an authorized representative of the Subcontractor, who can make decisions on the Subcontractors' behalf, must be present. At the direction of the Contractor, key Suppliers, sub-subcontractors and supervisors will be required to participate in the coordination and discussions and give summary reports of their activities.

9.2.2. The progress meeting gives the Subcontractor the opportunity to discuss with the Contractor any problems or potential problems arising out of the Project. Each Subcontractor shall attend progress meetings as requested by the Contractor and shall come to the meeting prepared to discuss its work status and how it relates to the project schedule.

9.2.3. The project schedule will be updated by the Contractor as indicated in the Project Manual and presented at the progress meetings. Each Subcontractor will be expected to discuss, as a minimum, the status of shop drawings, material and equipment delivery, job progress and quality control.

9.2.4. Refer to Division 01, Section "Project Management and Coordination" for additional contract requirements regarding meetings.

9.3. Pre-Installation Conference

9.3.1. Contractor will conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.

9.3.1.1. Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. All Contractors (including field superintendents and/or foremen) performing or directly affected by a particular scope of work will be required to attend.

9.3.1.2. Contractor will prepare the meeting agenda. Items for discussion will include review progress of other construction activities and preparations for the particular activity under consideration.

9.4. Coordination Meetings

9.4.1. Contractor may conduct additional Project coordination meetings as needed to resolve issues or coordinate upcoming work. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.

10. PROGRESS SCHEDULE

10.1. Contractor will prepare a critical path schedule for construction including actual construction activities, submittals for major components, procurement of materials and equipment, and testing of major building systems and periodically update the progress schedule throughout the Project. (Refer to Division 01, Section "Project Management and Coordination" for specific contract requirements regarding scheduling.)

10.2. Each Subcontractor is to submit [within 7 calendar days] after receiving its Notice to Proceed and prior to the preconstruction meeting, a schedule indicating durations for submittals, fabrication, delivery and installation of the components for its Scope of Work. This information will be utilized in the completion of the progress schedule presented at the progress meeting.

10.3. As changes occur in the schedule information provided by the Subcontractors, the Subcontractor is responsible for forwarding the information to the Contractor immediately. The Contractor will utilize this information in issuing updates to the progress schedule.

10.4. The Subcontractor it will substantially complete the work in accordance with the schedule developed by the Contractor. A construction milestone schedule has been included in Section 00 31 00. A detailed project schedule is available at Contractor's office and is available for review by all Subcontractors.

10.4.1. The Subcontract hereby agrees to commence work under the Contract within seven (7) days after the date of a Notice to Proceed, unless otherwise stipulated in that notice.

10.5. ***Substantial Completion of the Work***: The Subcontractor will have the work ready for either the following subcontractor's work or the final inspection and Owner's acceptance within the time limit stated in the Schedule and as defined in the scopes of work (reference Section 00 24 00).

11. GENERAL REQUIREMENTS FOR WORKMANSHIP

11.1. Manufacturer's requirements shall be strictly followed for storage, preparation, installation, cleaning, protecting and testing of all products and materials except where specific requirements included in specifications exceed those requirements. Where conflicts between manufacturer's requirements and Subcontract Documents occur, Subcontractor shall notify Contractor and request resolution prior to proceeding.

11.2. The Subcontractor is required to inspect jobsite, coordinate with other trades and field verify dimensions where applicable prior to fabricating product or material.

11.3. Manufacturer's requirements and industry standards are to be followed in regards to the effect of temperature, moisture and humidity on products and materials.

11.4. Materials and equipment are to be installed plumb, level and true, with uniform joints and edge conditions, tight seams and neatly fitting adjoining materials, unless specifically shown otherwise.

11.5. Materials and equipment are to be installed as dimensioned on the drawings. If dimensions or height are not dimensioned on the drawings, Subcontractor is to issue a RFI to the Contractor requesting location of item in question.

11.6. Cleaning of materials and equipment shall be completed in a manner as not to damage the finish.

11.7. Equipment and material shall be protected by Subcontractor following installation with labels intact until final cleaning.

12. QUALITY CONTROL AND INSPECTIONS

12.1. Refer to Division 01, Section "Testing & Inspection Services" for specific Contract requirements regarding testing and inspections.

12.2. The Subcontractor shall advise the Contractor's on-site field superintendent of all scheduled tests [two (2) working days] in advance.

12.3. The Subcontractor's quality control representative will review his drawings, procurement documents and contracts to ensure that the technical information provided and all work performed is in accordance with the latest revision of the Subcontract Documents. These documents shall be updated to reflect all changes made through Addenda, Change Orders and Requests for Information.

12.4. The Subcontractor's quality control representative will perform an inspection upon receipt at the site, of all materials, equipment and supplies. Items which are damaged or not in conformance with the respective Submittals, quality standards, Subcontract Documents, contract drawings and Specifications, will be identified and segregated from accepted items. Items thus identified will not be incorporated into the Work until corrective action, acceptable to the Contractor and Architect is completed.

12.5. The Subcontractor is responsible for the quality of the work performed by his work force and its sub-subcontractors, as well as the quality of the material, equipment and supplies furnished by the Subcontractor to be incorporated into the work. The Subcontractor will designate a quality control representative who will be on site at all times when work is in progress.

13. CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

13.1. Personnel and Materials Hoisting

13.1.1. Crane: The Contractor will not provide a crane for materials hoisting.

13.1.2. Vertical material and personnel management: The Contractor will not provide a personnel hoist or scaffold stairs.

13.1.3. Horizontal material management: The Contractor will not provide any equipment to move materials.

13.1.4. Scaffolding: The Subcontractor shall provide all scaffolding (unless noted otherwise) required to complete its work.

13.1.5. Lifts: The Subcontractor shall provide all lifts and other necessary equipment (unless noted otherwise) required to complete its work.

13.1.6. Temporary Elevator Use: Temporary elevator use will be permitted at the discretion of the Contractor's Superintendent and the Owner. The Contractor will provide temporary protection for the cab interiors of one car of general use as allowed by the Owner. If temporary elevator use is necessary, other than the car designate, the Subcontractor requiring use will be responsible for providing full protection of the elevator.

13.1.7. Existing Stair Usage: Existing stairs may be utilized at the discretion of the Contractor's Superintendent and the Owner. Protection of stairs will be the responsibility of the Contractor.

13.2. Disposal and Trash Removal

13.2.1. All Subcontractors shall comply with the requirements of Specification 01 74 20.

13.2.2. The Contractor will provide dumpsters for Subcontractors use, except for Subcontractors performing demolition work. Subcontractors performing demolition work are to provide dumpsters for all their demolition materials to be hauled off. Dumpsters may be allocated by material type. Subcontractor is responsible to sort debris to appropriate dumpster.

13.2.3. Subcontractor will clean up and remove to designated points at the site, daily and as directed by the Contractor, all rubbish and debris resulting from the Subcontractor's work and shall clean up its work to the satisfaction of the Contractor.

13.2.4. Subcontractor shall maintain [one (1) laborer] for clean-up purposes for every [ten (10) workers] on site (including 2nd tier subcontractors), or ratio thereof.

13.2.5. In the event the Subcontractor fails to clean up in accordance with the directions, the Contractor, after [twenty-four (24) hours] written notice to the Subcontractor, reserves the right to arrange otherwise for the clean up to be done and charge the Subcontractor the cost.

13.2.6. Subcontractors shall ensure that all boxes, cartons, etc. are crushed to the minimum volume prior to placing in the trash containers or trash collection areas.

13.2.7. No paint cloths will be allowed in trash containers.

13.2.8. The disposal of any material, waste, effluents, trash, garbage or oil, grease, chemicals, etc. resulting from either demolition or new work, shall be disposed of in accordance with all applicable laws and shall be subject to the approval of the Contractor.

13.2.9. Contractor will coordinate progress cleaning for joint-use areas where more than one installer has worked.

13.2.10. An area will be designated for lunch and breaks. All food or drink, other than water, consumed on site must be in this pre-approved area and all waste disposed of in trash receptacles furnished by the Contractor. All food and drink, other than water, is prohibited in any other work area.

13.3. Temporary Toilets

13.3.1. Temporary toilet facilities shall be furnished, and maintained as required by Contractor. The toilets shall be in sufficient number and at various locations to accommodate the workforce. The use of these toilet facilities by all members of the workforce is mandatory.

13.4. Temporary Water

13.4.1. Owner will pay all water utility bills on the project.

13.4.2. The Plumbing Subcontractor will provide and maintain temporary potable water for the other Subcontractors' use throughout the building and at the jobsite as determined by Contractor.

13.4.3. Subcontractor requiring additional temporary water service will be responsible to make arrangements for this work through the Plumbing Subcontractor and be subject to the approval of Contractor. Associated cost of additional water service will be paid by the Subcontractor requesting the service.

13.4.4. It will be the responsibility of the Subcontractor utilizing temporary water to protect the Project against water damage. When using water, Subcontractor is required to use new materials and replace worn or broken parts. Hoses, fittings, etc. that are leaking shall be removed. Subcontractor will be responsible for the cost of damages arising from violation of this policy.

13.4.5. Temporary water service shall be drained down and reactivated as required by the Plumbing Subcontractor to prevent freezing.

13.4.6. No bulk water will be provided.

13.5. Temporary HVAC

13.5.1. Temporary HVAC work includes, but is not limited to, caps for ductwork, temporary filters and filter media, necessary equipment warranty extensions, interim controls, fire watch, temporary stand alone smoke detectors for fan shut-down, ventilation and humidity control, monitoring of temperature and humidity, manual control of dampers (if required) and final clean-up of mechanical systems upon completion of construction work.

13.5.2. Ventilation and humidity control includes, but is not limited to, temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption. Relative humidity shall be controlled as required to reduce substrate moisture levels to level required to allow installation or application of finishes.

13.5.3. Heat required for specific work-oriented situations is to be provided by each subcontractor for its needs (i.e. masonry, EFIS, etc). General heating for creature comfort will not be provided by the Contractor.

13.5.4. Reference project specific temporary HVAC plan for the timeline of temporary conditioning inside the building.

13.5.5. Project Specific temporary HVAC plan

13.5.5.1. Mechanical subcontractor shall provide temporary heat and cooling (including ventilation and humidity control) during construction maintaining temperatures and humidity conducive to installation of the specified finishes as outlined in Division 00 Section "Milestone Schedule of Construction.

13.5.5.2. New and/or existing systems: The Owner will allow the use of new *and/or* existing systems for temporary heating and cooling.

13.5.5.3. Rental equipment for temporary conditioning:

13.5.5.3.1. If permanent HVAC systems are not available when required as defined in this section (due to Subcontractor not maintaining the Milestone Schedule), Mechanical Subcontractor shall provide temporary units (including all equipment, fuel, and fire watch as required) to maintain both temperature and humidity. Fire watch will be required for any temporary heating equipment. If temporary units are utilized, Mechanical Contractor shall coordinate and include electrical costs associated with powering units. Coordinate type of temporary heating and cooling with the temporary electrical service or other utility capacities available at the time temporary heating and cooling is required. Verify electrical capacities with Electrical Contractor prior to selecting and installing heating and cooling system.

13.5.5.4. Utility Charges for permanent equipment: Owner will pay for utility charges incurred as a result of operating permanent equipment for temporary HVAC.

13.5.5.5. Utility Charges for rental equipment: Owner will pay for utility charges incurred as a result of operating rental equipment for temporary HVAC. Fuel charges will be the responsibility of the subcontractor providing the equipment.

13.5.5.6. Monitoring: During temporary conditioning site conditions shall be monitored. The Contractor will provide data loggers to perform this function. A sling-psychrometer may also be used as they are recognized by the HVAC industry to provide accurate readings.

13.5.5.7. Humidity control: A heating load may be required to control relative humidity during summer conditions. In humid climates it may be necessary to provide additional moisture removal using dehumidification systems.

13.5.5.8. Mechanical Subcontractor shall coordinate electrical requirements for temporary HVAC with the Electrical Subcontractor and other affected Subcontractors.

13.5.5.9. Reference Section 15.11 regarding safety issues during temporary conditioning/temporary heat.

13.5.5.10. Use of permanent systems

13.5.5.10.1. Subcontractors shall include necessary warranty extensions for all equipment utilized during temporary HVAC.

13.5.5.10.2. Equipment safeties: Mechanical subcontractor shall provide stand alone fire alarm devices for AHU shut down as required for temporary heating and cooling. Coordinate any other fire alarm requirements with the Electrical Subcontractor. Other safeties may be required if circumstances dictate, such as: a high static safety on the leaving side of the fan ahead of first fire smoke damper to protect the duct work, a low pressure static safety on return duct applications with a return fan, freeze protection along with control sequences to protect water coils. The leaving air temperature must be below dew point (approximately 55º) to provide adequate moisture removal. Discharge air temperature must remain constant due to the use of 100% outside air.

13.5.5.11. Reference Attachment C, "Construction Indoor Air Quality" for cleanup guidelines, ductwork cleanliness, and temporary heating and cooling guidelines for maintaining proper indoor air quality.

13.5.5.12. Reference Attachment E, "Special Project Procedures for Healthcare Facilities" for infection control requirements for HVAC systems.

13.6. <u>Temporary Electrical (Power, lighting, fire alarm)</u>

13.6.1. Owner will pay usage costs for electrical power.

13.6.2. Electrical Subcontractor will furnish, install, relocate, maintain and remove all necessary temporary wiring, lighting fixtures, protective devices, distribution panels, and transformers, etc. required for construction purposes conforming to rules and regulations of OSHA as well as other agencies having local jurisdiction. Work includes electrical power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Electrical Subcontractor shall coordinate temporary power requirements for trailers, equipment, and other special needs as required to execute the work. Reference paragraph 14.1 of this section for specific equipment. Each Subcontractor shall coordinate any further special temporary electrical requirements with Electrical Subcontractor.

13.6.3. Electrical Subcontractor shall make all necessary arrangements with the utility company to provide temporary service. All electrical connections must meet local code requirements.

13.6.4. All Subcontractors will be responsible for their power extension cords from the temporary panels to their work areas. These cords shall be three wire (including ground wire) of sufficient capacity for service intended and fully approved by all governing bodies.

13.6.5. Each Subcontractor shall coordinate and pay for any further special temporary electrical requirements with the electrical subcontractor. Approval shall be provided by the Contractor.

13.6.6. Electrical Subcontractor shall provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions. Lighting shall be as required by OSHA, but no but not less than one lamp per room. Minimum footcandles as defined by OSHA shall be maintained at all times.

13.6.7. Electrical Subcontractor shall provide temporary lighting that fulfills security and protection requirements without operating entire system.

13.6.8. Additional temporary light requirements (task lighting) shall be the responsibility of individual Subcontractors.

13.6.9. When required by code or by the Owner, Electrical Subcontractor shall provide temporary fire alarm system tied into existing fire alarm control panel. This temporary system shall be completed and functional at all times. No part of the temporary system shall be used for the permanent system. Work includes removal and maintenance of the temporary system.

13.7. Temporary Communication Systems

13.7.1. Telephones will not be provided for tradesmen for their personal use.

13.7.2. Subcontractor shall provide radios for all supervisory personal. Radios shall be as defined by Contractor to allow for common frequency and open communication.

13.7.3. Subcontractors requiring telephone service must make their own arrangements, with the approval of Contractor.

13.8. Construction Fence

13.8.1. Contractor will contract to erect and maintain a construction fence around the perimeter of the site and staging area as indicated on the site access plan. Fence gates will be located to provide access/egress as determined by Contractor. Subcontractor shall not remove sections of the fence without approval from Contractor. Subcontractors granted approval to remove a portion of the construction fence will be responsible to replace and restore those sections to the satisfaction of Contractor. Reference site access plan section 00 30 00 for further detail.

13.9. Temporary Onsite Structures

13.9.1. Each Subcontractor shall make its own arrangements with the Contractor for office facilities as designated by the site access plan. Subcontractor shall provide, maintain and remove his own offices and storage facilities.

13.9.2. Temporary power, telephone and water service requirements to its onsite structures shall be the responsibility of the individual Subcontractors. Services will be provided to a central location per the logistics plan for use by the Subcontractors.

13.10. Storage

13.10.1. Onsite storage shall not be allowed except as specifically approved by the Contractor and as defined in the scope of work. Contractor will not assume any responsibility for any stored materials.

13.10.2. If it becomes necessary at any time during construction to move materials which are to enter into construction or equipment and barricades which have been temporarily placed, the Subcontractor furnishing these materials, equipment or barricades shall, when directed by the Contractor, move them or cause them to be moved without additional charge to the Contractor.

13.11. Temporary Enclosures

13.11.1. Any in progress or recently completed portions of work requiring protection from exposure to foul weather and detrimental operations shall be protected by the Subcontractor performing that work.

13.12. Fire Protection

13.12.1. Contractor will provide fire extinguishers of proper type and number as required. Subcontractor shall provide firewatch as required to perform its work. Notify Contractor and Owner when welding, cutting or any activity that could create a fire hazard.

13.12.2. The Fire Protection Contractor shall provide temporary fire protection during the course of the construction renovation. This system shall be in accordance with all local, state and federal requirements.

13.13. Surveying

13.13.1. Benchmarks will be established and maintained by the Contractor. Any inconsistencies found in dimensions or elevations shall be reported to the Contractor before proceeding with work.

13.14. Site and Area Restrictions – Reference site access plan described in Section 00 30 00.

13.14.1. Access and egress to and from the site is under the control and direction of Contractor. All Subcontractors will be responsible for advising Contractor of their delivery schedules and will coordinate the work of various Subcontractors as to minimize delays.

13.14.2. Storage on site is very limited and all materials delivered and stored on site must be coordinated and approved by contractor at least 2 weeks in advance.

13.14.3. No assigned or designated parking will be provided for Subcontractors. Reference RECS website for additional information: http://www.admin.state.mn.us/recs/cs/design/AppendixA-1.Pdf

13.14.4. The Swing Parking Subcontractor will construct and maintain temporary roads and paved areas adequate for construction operations as described in the site access plan. At a time directed by the Contractor, remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction.

13.14.5. Traffic Controls: Each Subcontractor shall comply with requirements of authorities having jurisdiction. Protect existing site improvements to remain including curbs, pavement, and utilities. Maintain access for fire-fighting equipment and access to fire hydrants.

13.15. Water and Snow Removal

13.15.1. Dewatering Facilities and Drains: Each Subcontractor will be required to maintain the project site, excavations, and construction free of water to maintain progress of the work. Comply with requirements of authorities having jurisdiction.

13.15.2. Pump water and push water: Each Subcontractor will be required to remove water as required to maintain progress of the work.

13.15.3. Snow and Ice Removal: The Contractor will be responsible for general snow and ice removal as required to maintain progress of the work. The use of calcium chloride as an aid or means to remove snow or ice will not be permitted.

13.16. Security And Protection Facilities Installation

13.16.1. Temporary Erosion and Sedimentation Control: The Swing Parking Subcontractor will provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to authorities having jurisdiction and Contract Documents.

13.16.2. Stormwater Control: The Swing Parking Subcontractor shall comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

13.16.3. Tree and Plant Protection: The Swing Parking Subcontractor shall 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.

13.16.4. Barricades, Warning Signs, and Lights: The Contractor will comply with requirements of authorities having jurisdiction (and as required for adequate pedestrian and traffic safety) for erecting structurally adequate barricades, including warning signs and lighting.

13.16.5. Temporary Egress: All subcontractors shall assist the Contractor will maintaining temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

13.16.6. Temporary Partitions: The Contractor will provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side. Where fire-resistance-rated temporary partitions are indicated or are

required by authorities having jurisdiction, construct partitions according to the rated assemblies.

13.16.7. Site Security: Site security will not be provided on the project.

13.16.8. Background Checks: All construction personnel will be required to pass a background check in order to work on the Capitol Complex. Reference RECS website: http://www.admin.state.mn.us/recs/cs/design/backgroundcheck.pdf

13.16.9. Identification Badges: Only construction personnel that have a State issued ID badge will be allowed onsite. ID badges are issued after a worker has submitted for and cleared a background security check. The cost for badges shall be the responsibility of the individual and will be $7/badge. A check is the only acceptable payment method.

14. DISRUPTION OF EXISTING SERVICES

14.1. All work relating to the disruption of existing services shall be coordinated with the Owner and at such times as scheduled by the Contractor. A minimum one week notification period is required for all shutdown requests to allow time for the coordination and planning process. The Subcontractor will be responsible to submit a written request to the Contractor for such request with proper notification to maintain the project schedule.

14.2. All shutdowns will need to be performed afterhours during the years 2013 and 2014. During the year 2015, only shutdowns that affect the East Wing of the Capital Building will need to be performed afterhours. During the year 2016 all shutdowns may be performed during normal work hours. If the Owner should require any other portion of work to be performed afterhours, reimbursement shall be made for the premium time expenses only, without markup.

14.3. It shall be the responsibility of the Subcontractor responsible for the work scope to relocate any existing service necessary for life safety or building operation that may be displaced from the installation of new or temporary partitions. This includes, but is not limited to, light fixtures, diffusers, exit devices, fire protection devices, sprinkler heads, access control, thermostats, communication devices, or other items.

14.4. All shutdowns shall be continuous until existing services are put back into service and verified that they are functioning properly.

15. PERMITS

15.1. The general building permit will be obtained by the Contractor. All other permits will be procured by the Subcontractor(s).

15.2. Each Subcontractor will be responsible to call for all necessary inspections as may be required by governing agencies including the Health Department if applicable.

16. SAFETY

16.1. General

16.1.1. Safety on the project site is a primary concern to the Owner and Contractor. Each Subcontractor is responsible for the safety and security of its employees.

16.1.2. All Subcontractors and lower tier subcontractors are required to follow all of Contractor's safety requirements, OSHA, state and local safety regulations.

16.1.3. Each Subcontractor is responsible for providing the proper training and equipment necessary to ensure that their employees follow all of Contractor's safety requirements, OSHA, state and local safety requirements.

16.1.4. Each Subcontractor is responsible for inspecting their work areas periodically throughout the day for recognizable safety hazards and for taking immediate corrective actions to provide a safe work environment at the site.

16.1.5. Safety Representative - Each Subcontractor will assign a competent individual to act as the Subcontractor's safety representative. This individual must be on site and have the authority to immediately correct hazardous conditions. The name of the on-site representative shall be submitted to the Contractor prior to the Subcontractor beginning work.

16.1.6. All subcontractors and lower tier subcontractors are required to follow the safety program included in the CIP manual in addition to these requirements. If there is a conflict, the safety requirements in the CIP manual shall govern.

16.1.7. Hotwork Pass: All subcontractors are required to follow the State's Hotworks Standard Operating Procedures. Reference RECS website: http://www.admin.state.mn.us/recs/cs/design/AppendixA-1-pmdhotworks.pdf

16.2. Disciplinary Policy:

16.2.1. Failure to follow safety requirements may result in disciplinary action up to and including the removal and replacement of employees and site foreman per Contractor's safety policy.

16.2.2. Each Subcontractor is responsible for replacing foreman and employees who are unable or unwilling to follow the Project safety requirements.

16.2.3. Each Subcontractor is responsible for enforcing its safety program and OSHA requirements as it relates to their work at the project.

16.2.4. Failure to correct safety issues in a timely manner may result in Contractor directing a correcting Subcontractor to take action and a back charge may be issued to the creating contractor.

16.3. Training requirements:

16.3.1. Copies of all training must be forwarded to the Contractor's site office. This documentation must include a detailed description of the items covered in the training and the signatures of the attendees.

16.4. Orientation:

16.4.1. Each Subcontractor is responsible to attend a safety orientation conducted by the Contractor prior to the start of work to familiarize all employees with the site, safety requirements, and specific safety policies and procedures as it applies to their work.

16.5. Task specific training:

16.5.1. Task specific training must be provided by each Subcontractor to ensure that each employee knows how to perform their work in a safe manner.

16.5.2. Task specific training must be conducted following the identification of a safety issue concerning a particular crew and weekly at a minimum.

16.6. MSDS:

16.6.1. A copy of the MSDS program including a written program and a copy of the MSDS sheets for all products that will be used at the project must be provided to the Contractor prior to the start of Subcontractor's work at the Project.

16.7. Personal Protective Equipment:

16.7.1. OSHA approved hard hats, protective eye wear, and safety vests or bright shirts shall be worn by all personnel and visitors on the jobsite at all times. Proper clothing shall be worn, suitable for construction work. Shirts and long pants shall be worn at all times. Durable work shoes are required; canvas or leather type athletic shoes and shoes without heels or toes are not permitted. All other personal protective equipment shall be furnished by the Subcontractor to its employees as required.

16.8. First Aid:

16.8.1. The Contractor will maintain a first aid center at the Project office. The Contractor will have phone numbers of the local clinics and hospitals posted at all times.

16.9. Housekeeping:

16.9.1. Good housekeeping shall be maintained at all times. All stripped lumber shall be safely stacked after nails have been removed or bent down. All stairways, scaffolds, ramps, walkways, and work areas shall be kept clear and clean of trash and material. Work areas shall be maintained free from accumulation of combustible trash.

16.9.2. All Subcontractors are responsible for cleaning their work areas each day. Failure to clean work areas each day may result in Contractor directing a correcting Subcontractor to take action and a back charge may be issued to the creating contractor.

16.10. GFCI:

16.10.1. Each Subcontractor is responsible for providing GFCI protection for their work when using generators or permanent electrical installations.

16.11. Temporary Guardrails and Barricades

16.11.1. All subcontractors requiring access to the roof areas shall observe 100% tie off. Engineered tie off points will be the responsibility of the Subcontractor requiring access.

16.11.2. The contractor will install and maintain interior temporary guardrails around shaft openings. Subcontractors requiring access will be responsible for removing and replacing the rails, and all necessary safety equipment for 100% tie off while the rails are removed.

16.12. Electrical Contractor only:

16.12.1. All electrical installations must be installed per applicable OSHA and NEC standards.

16.12.2. Ground Fault Circuit Interrupters must be installed in all temporary installations.

16.12.3. Lighting must be provided sufficiently and in a timely manner.

17. CODE OF CONDUCT

17.1. Because this Project may involve working in and around occupied facilities and/or public areas, Subcontractor and all of its employees are required to comply with the following:

17.1.1. Subcontractor and its employees are expected to perform their work in a professional manner.

17.1.2. Subcontractor is not to converse or talk with employees of Owner. All construction related questions are to be directed to Contractor.

17.1.3. Inappropriate language or gestures, profanity, or lewd conduct are strictly prohibited.

17.1.4. Tobacco use on the Project site is prohibited.

17.2. Violations of this policy could result in immediate dismissal from the site.

SECTION 00 73 00
SPECIFIC PROJECT REQUIREMENTS
Attachment C
Construction Indoor Air Quality

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section defines the Indoor Air Quality Plan which focuses on providing a clean construction environment in order to produce not only an improved final product but also an improved working environment during construction. Each project will require a tailored IAQ Plan in order to account for any unique construction activities that may necessitate additional IAQ directives.

B. Section includes requirements for:

1. Clean-up methods for maintaining indoor air quality.
2. Use of vacuums.
3. Cutting.
4. Ductwork cleanliness guidelines.
5. Protection of absorptive materials from moisture damage.
6. Temporary heating and cooling.
7. Existing facility guidelines.

C. Related Sections:

1. Division 01 Section "Temporary Facilities and Controls" for other specific requirements for temporary facilities.
2. Division 01 Section "Execution" for other requirements for cutting and patching and progress cleaning.
3. Division 00 Section "Construction Waste Management and Disposal" for other requirements for waste disposal.
4. [Division 00 Section "Special Project Procedures for Healthcare Facilities" for other requirements in Healthcare and Life Science construction.]

1.3 SUBMITTALS

A. Indoor Air Quality (IAQ) Plan – After attending a pre-coordination meeting with the Contractor, the Mechanical Subcontractor with guidance from the Contractor shall submit a project specific construction indoor air quality plan describing proposed usage for existing or new temporary HVAC systems and electrical requirements. Coordinate with Electrical Subcontractor.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: The IAQ guidelines outline the basic information necessary to accomplish the required environmental conditions.

B. Clean-Up Methods: In order for a Subcontractor to maintain the basic required conditions for an acceptable IAQ environment daily clean-up methods must be performed. These include the following steps:

1. Daily clean-up of all waste products.
2. Walk-off mats – Often times the most dust and debris comes from outside of the building during poor weather conditions. Temporary walk-off mats should be used at all entrances. Walk off mats shall be provided by *[the Contractor]*.
3. Vacuums should be readily available to each crew for immediate use. (See "vacuums" below for further information).
4. Additional clean-up during finishing will be required in order to mitigate dust and debris that may affect the end product.
5. Access points into the building will be restricted to a limited number. Similarly the trash routes and toilet facilities route may be restricted to these specific access points and therefore must be taken into consideration during planning.
6. Drywall Subcontractor shall vacuum out all stud tracks and chases before installing sheetrock.
7. Use wax based sweeping compounds (only if allowed by finish flooring manufacturer) to minimize dust.
8. Equipment rooms shall be cleaned regularly.

C. Vacuums: Although vacuums are only a tool for achieving a successful IAQ Plan the availability of these items becomes an important aspect during construction. The guidelines below provide information that must be followed.

1. Saws, sanders and other construction tools that create dust must be fitted with vacuums during use.
2. Shop Vacuums must have a working filter system. Any vacuums that do not appear to vacuum or filter the dust as expected may be required to be replaced per the direction of the Contractor.

D. Cutting: Once the building becomes enclosed the cutting methods require specific changes that will influence the flow of construction. Cutting within an enclosed space, especially during finishes, may be done only if necessary. The majority of cutting must be completed outside of the building enclosure and would not require any additional safeguards. Cutting within the structure without the following precautions will not be prohibited.

1. Wet cutting will be required during the cutting of most products within the building enclosure. This mostly pertains to the cutting of concrete and masonry although some finish products such as solid surfacing and tile work may also require wet cutting.

2. Cutting of some products such as gypsum board or millwork may need to be performed inside due to weather constraints. These products must utilize saws that can be fitted with vacuums.

3. Cutting stations may be built to provide an efficient process for a large amount of cutting. These stations may be designated rooms sealed off to contain the dust and debris. A designated cutting room must be accompanied by a permanent vacuum and daily clean-up of this room will be required. A mobile cutting station could be a secondary option for interior cutting. The mobile station concept will allow for a crew to maintain a close proximity to the current work area while still restricting dust and debris.

E. Ductwork Cleanliness Guidelines: Guidelines for ductwork cleanliness shall be as follows (follow other Contract Document requirements if more stringent than requirements listed in this section):

1. Ductwork Fabrication

   a. Shop or factory fabricated ductwork shall be manufactured in a shop environment with the mill oil film removed. When shop fabricated ductwork and fittings are shipped to the site completely assembled, both ends shall be sealed with an adhered protective covering (hairnets are not acceptable).

   b. Ductwork may be shipped unassembled. This duct shall be kept covered and cleaned at the site as it is erected.

   c. Ductwork and fittings purchased from other fabricators, i.e. spiral, oval, etc., and delivered directly to the jobsite, shall be cleaned and capped and mill oil removed.

   d. Duct fabrication labels shall be placed on duct exterior only. No paper identification labels shall be inside the duct.

2. Shipping: All ductwork and accessories shipped from fabrication shop(s) shall be shipped in an enclosed trailer or enclosed truck to protect the ductwork from damage, dirt, and moisture during transit to the jobsite.

3. Storage: Ductwork that is delivered to the site shall be installed as soon as possible. Care shall be taken to schedule only enough material on site for the immediate workload. If ductwork is to be stored on the site, it must be in enclosed vans or inside the building at least 4" above the floor to avoid damage from weather or spills. Openings shall remain sealed until installed.

4. Installation

   a. Duct cleanliness for installed ductwork systems shall be maintained to meet the requirements for fabricated ductwork (see above). The ductwork shall be cleaned as necessary to maintain these conditions.

   b. Cover all ends of installed ductwork at the end of each workday, or when work is suspended for any length of time, i.e. breaks, lunch, etc. Hair nets are not acceptable.

   c. If installed prior to roofing, protect ductwork from water infiltration.

5. Special Systems (Surgery, Pharmacy, Labs etc.): Any special systems, as outlined in the specifications or noted on the drawings, shall be internally cleaned with sterilizing

alcohol. All openings shall be kept sealed and not opened for air outlet installation until all room finishes and dust related work is completed. Ductwork and equipment for these systems shall not be utilized for temporary heating and cooling. If conditioning of these spaces is required, temporary units may be necessary. These systems shall not be brought on-line until dust generating activities are complete (as directed by the Contractor).

6. Air Outlets Diffusers and Grilles:

   a. Air outlets shall be installed with filter media or blanked off (as directed by the Contractor).

   b. Return air shall not be activated until all dust generating activities are complete. If return air must be activated prior to completion, upon approval by the Contractor, install filter media on return duct openings.

   c. Equipment

      1) Air Handling Units, including their respective mechanical equipment rooms, and rooftop units are to be inspected for dirt/debris prior to any filter installation/start-up and shall be cleaned as necessary. Use 10% Isopropyl Alcohol-Water solution to wipe down the inside surfaces of the air handlers. Use proper ventilation whenever cleaning with an Isopropyl Alcohol solution.

      2) All VAV terminal units shall be shipped from the factory and completely sealed and shall not be opened until they are installed and ductwork connected. Also terminal units are to be protected even if installed.

F. Protection of absorptive materials from moisture damage: HVAC Pipe or Ductwork insulation shall be stored 4" off the floor and covered to protect it from moisture and dirt, if necessary. Once installed this is the responsibility of the Subcontractor until the owner has accepted the work.

G. Temporary Heating And Cooling

1. General: The following is a basic guide for the use of existing or new HVAC equipment to be used for temporary conditioning during construction. Each job is unique as to the type of equipment on site, construction schedule, and construction type. Following a pre-coordination meeting with the Owner, Contractor, and Design Team, the Mechanical Subcontractor in conjunction with the Contractor shall submit their plan for coordination and have it reviewed for approval.

   a. Reference Division 00 and 01 Sections "Temporary Facilities and Controls" for additional requirements.

   b. Proper execution of the temporary HVAC and IAQ program should result in clean ductwork systems at project substantial completion. Should ductwork become contaminated, Subcontractor will be held accountable for measures to test and clean ductwork.

2. Use of Systems and Equipment

   a. Filtration: [Contractor or Subcontractor] shall provide and maintain equal to or greater filtration during temporary conditioning than specified for the final intended use of the system. Utilized rolled media on all filter banks to facilitate increasing

the life of the filters during temporary conditioning. Filtration of duct openings, such as return air diffuser and supply diffuser may be required to protect duct work. Prior to starting any duct system, all duct insulation shall be installed. Insure all fire smoke dampers are open (manually, if required).

b. Return air: If the use of return air duct systems is required prior to the completion of final finishes (in an area served by an AHU) filtration is required at each return grille.

c. Unit cleaning: At the completion of temporary conditioning, all internal components of the AHU must be cleaned by the Mechanical Subcontractor (i.e. coils, fans, damper, condensate pans, flow stations, humidifiers, etc.). Use 10% Isopropyl Alcohol-Water solution to wipe down the inside surfaces of the air handlers. Use proper ventilation whenever cleaning with an Isopropyl Alcohol solution.

d. Start-up and testing: Prior to start-up, testing, balancing and commissioning of any supply air/return air system and it's respective air handling equipment, the Mechanical Subcontractor and Contractor shall review the status areas served by the system. Upon approval, the Subcontractor will commence preparations for system testing. Temporary filter media (installed over the pre-filter banks), pre-filters and final filters shall be installed in the air handling units. The extra filtration should remain in place until the TAB subcontractor is ready to perform performance checks on AHUs. Should any dust making activities occur after this point, the air handling equipment shall be shut down and protected.

H. Existing Facility Guidelines

1. Follow *SMACNA IAQ Guidelines for Occupied Buildings under Construction*.

2. [Reference Division 00 Section "Special Project Procedures for Healthcare Facilities" for infection control and interim life safety measures required for working in existing facilities.]

3. [Reference Division 00 Section "Special Project Procedures for Healthcare Facilities" for requirements for environmental controls and HVAC system requirements.]

SECTION 00 73 16
INSURANCE PROGRAM

DUNN CONTROLLED INSURANCE PROGRAM (DCIP)

Controlled Insurance Program Requirements & Forms For General Liability Only

(Subcontractor shall not include cost of on-site GL insurance in bid)

Sponsored by JE Dunn Construction Group, Inc., or one of its subsidiaries or affiliates

THIS MANUAL IS PART OF YOUR CONTRACT.

I. Introduction

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I. Introduction

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Subcontractor Enrollment Application – GL Only Program
Certificate of Insurance – Enrolled Subcontractors
Certificate of Insurance – Non-enrolled Subcontractors
Claim Reporting Form

This manual has been prepared to provide general information about the Dunn Controlled Insurance Program and the procedures to be followed by Enrolled Subcontractors. **This manual is not** a substitute for policies issued, nor is it to be interpreted as altering or changing any of the general or special conditions or other terms of the insurance contract as it pertains to insurance coverage or any other duties or responsibilities of any contractor or subcontractor(s) enrolled in this program.

I. Introduction

What is a Controlled Insurance Program?

The Dunn Controlled Insurance Program (DCIP) is a coordinated master insurance, safety and claim management program for the Contractor and all Enrolled Subcontractors working on the Project.

What coverage will the DCIP provide?

The following coverage is provided by the DCIP for the Contractor and ***Enrolled*** Subcontractors: onsite General Liability and onsite Umbrella/Excess Liability.

What are an Enrolled Subcontractor's obligations as a participant in the DCIP?

- ❑ Contracts are to be bid with the costs of providing the insurance required in this manual included in its overall price for the Work, but **excluding** onsite General Liability coverage costs.
- ❑ Complete the *Subcontractor Enrollment Application-GL Only Program* form prior to starting work. (Section XII)
- ❑ Provide Certificate(s) of Insurance evidencing all coverage required in this manual to be furnished by Enrolled Subcontractors and not provide under the DCIP. (Sections XII)
- ❑ Comply with all on-site safety requirements including, but not limited to, the DCIP Project Safety Program. (Section XI and http://www.jedunn.com/spq/safetyprogram/)
- ❑ Immediately report accidents or occurrences as required in the Claims Procedures. (Section X)

What are a Non-enrolled Subcontractor's obligations?

- ❑ Contracts are to be bid with **all** costs of providing insurance required in this manual included in its overall price for the Work. (Section VII)
- ❑ Provide Certificate(s) of Insurance evidencing all coverage required in this manual to be furnished by Non-enrolled Subcontractors. (Sections VII and XII)
- ❑ Comply with all on-site safety requirements including, but not limited to, the DCIP Project Safety Program. (Section XI and http://www.jedunn.com/spq/safetyprogram/)
- ❑ Immediately report accidents or occurrences as required in the Claims Procedures. (Section X)

I. Introduction

Who is excluded from the DCIP?

Unless allowed by Contractor, the following parties, including their sub-subcontractors of any tier, are excluded from the DCIP:

- Subcontractors performing hazardous material remediation;
- Subcontractors performing structural demolition;
- Subcontractors performing blasting operations;
- Elevator subcontractors;
- Architects, engineers, surveyor, testing laboratories, and their consultants; and
- Vendors, suppliers, material dealers, haulers and/or independent haulers, and firms whose sole function is to transport, pick up, deliver, or carry materials, supplies, tools, equipment, parts, or other items or persons to or from the Project site.

Contractor reserves its right to exclude any and all Subcontractors and/or sub-subcontractors of any tier from the DCIP.

Important Facts

- **Enrollment:** Enrollment in the DCIP by all eligible Subcontractors is mandatory (unless specifically excluded by the Contractor) but not automatic. **Satisfactory completion of enrollment forms is required PRIOR TO STARTING WORK AT THE PROJECT SITE.**

- **Enrolled Subcontractors:** The DCIP shall apply to the Contractor and eligible Subcontractors who have complied with the insurance requirements and completed the enrollment process. Contractor reserves the right to exclude any Subcontractor from the DCIP.

- **Excluded Subcontractors/Activities:** See Section II *Definitions* to review the parties and activities excluded from DCIP coverage. The Contractor, at its sole discretion, will determine which Subcontractor(s) of any tier will participate in the DCIP. The DCIP shall not apply to vendors, suppliers, material dealers, haulers and/or independent haulers, and others who merely transport, pick up, deliver or carry materials, personnel, parts or equipment, or any other items or persons to or from the Project site.

- **Scope of Insurance:** Unless otherwise specifically indicated, the coverage set forth in Section IX *DCIP Insurance Provided for Enrolled Subcontractors* will cover only those operations of the enrolled parties performed in connection with the Work on the Project site and employees of the enrolled parties while performing the Work on the Project site. The DCIP shall not apply to the operations or the employees of any Subcontractor at their offices, factories, warehouses or otherwise not on the Project site.

- **Safety:** Strict compliance with Section XI *Project Safety Program*, the Dunn national safety program (at http://www.jedunn.com/spq/safetyprogram/), and any other safety requirements in the Contract Documents will be required at all times. Failure to comply

is a default of the Subcontract and could result in being denied coverage under the DCIP, being denied access to the Project site, or termination of the Subcontract.

- **If an Enrolled Subcontractor contracts with a lower tier subcontractor, including contract employee(s) and temporary employment agencies, the Subcontractor is responsible for the following:**

  1. Include this manual and all requirements within it as a part of the Enrolled Subcontractor's lower tier subcontract agreement(s). Ensure that such lower tier subcontractors fulfill all obligations as required of you as a Subcontractor under the DCIP.

  2. Notify the Contractor of all subcontract awards utilizing the Subcontractor Enrollment Application-GL Only Program form. (Section XII *Forms*).

  3. Have the Subcontractor(s) bid their contract with the costs of providing insurance required in this manual included, **but excluding onsite General Liability coverage cost**.

  4. All Enrolled Subcontractors will be required to meet the DCIP insurance requirements. The Contractor has the authority to deny access to the Jobsite for noncompliance of insurance or safety requirements. **SUBCONTRACTORS SHALL VERIFY THEIR LOWER TIER SUBCONTRACTOR(S) HAVE MET THESE REQUIREMENTS PRIOR TO AWARDING WORK, INCLUDING, BUT NOT LIMITED TO, COLLECTION OF ALL REQUIRED CERTIFICATES OF INSURANCE. Upon request, Subcontractor shall provide the Contractor with all certificates of insurance from Subcontractor's sub-subcontractors of any tier.**

Refer to Section V *Miscellaneous DCIP Requirements* for "Other Contractor and Subcontractor Obligations."

Who needs a copy of this manual?

- Subcontractor's administrative personnel who manage its insurance and/or its insurance agent/broker.
- Subcontractor's estimators, prior to bidding work on the Project.
- Subcontractor's safety personnel, who will need to educate its on-site workers with respect to the Project Safety Program requirements.
- Subcontractor's claims personnel, who will be responsible for turning in claims.
- Lower-tier subcontractors.

II. Definitions

The following definitions shall apply only for the purpose of this Project Insurance Manual.

Architect/ Engineer — The firm or team of firms that provide design services, including preparation of the construction documents under a contract with the Owner.

Contractor — Any subsidiary or affiliate of the J.E. Dunn Construction Group, Inc., which has the primary Project contract with the Owner or other entity and which subcontracts some or all work under a Contract between the Contractor and Subcontractors.

Contract/ Contract Document(s) — A written agreement between the Contractor or its designee and a Subcontractor.

DCIP — The Dunn Controlled Insurance Program under which certain insurance coverage are provided and paid for by the Contractor.

DCIP Administrator — **Lockton Companies, LLC**
444 West 47th Street, Suite 900
Kansas City, Missouri 64112-1906
Phone: 816-960-9000
Fax: 816-960-9099
email: WrapUpCIPCoordinators@lockton.com

Designated Representative — A representative approved by the Contractor and its subcontractor(s) to be readily accessible at all times during working hours for the purpose of reporting claims and completing claim reports.

Enrolled Subcontractor — A Subcontractor that has a contract with the Contractor or one of its Subcontractors for the Project and has been **approved** by the Contractor. Approval requires the Subcontractor to have previously:

1. complied with all insurance requirements, and
2. completed and returned to Contractor the Subcontractor Enrollment Application-GL Only Program.

II. Definitions

Excess/Umbrella

Any number of insurance policies that provide additional limits of coverage in excess of the limits provided by the primary policy.

Excluded Parties

1. Subcontractors performing hazardous material remediation and their sub-subcontractors of any tier.
2. Subcontractors performing structural demolition and their sub-subcontractors of any tier.
3. Subcontractors performing blasting operations and their sub-subcontractors of any tier.
4. Elevator subcontractors and their sub-subcontractors of any tier.
5. Architect, engineer, surveyor, or testing labratory and their subconsultants of any tier.
6. Vendors, suppliers, material dealers, haulers and/or independent haulers, and firms whose sole function is to transport, pick up, deliver, or carry materials, supplies, tools, equipment, parts, or other items or persons to or from the Project site.

Insurer

Commercial General Liability -	American Home Assurance Company/Lexington Insurance Company
Umbrella -	Chartis Specialty Insurance Company
Excess -	Lexington Insurance Company

Jobsite/Project site

Work or operations performed by the Contractor or Subcontractor at the designated jobsite. Jobsite work also includes areas adjacent to Project site or nearby described tracts of land where incidental operations are performed as specifically indicated in the Contract Documents.

This insurance does not apply to the operations of any Subcontractor(s) of any tier at their offices, factory, warehouse, or yards or otherwise not on the Project site**. The DCIP insurance coverage apply only to work performed at the Jobsite.**

Non-enrolled Subcontractor

Subcontractor excluded from the DCIP.

Owner

Owner as defined in the Contract Documents.

II. Definitions

Payroll	Total earnings of the Subcontractor's employees while working at the Jobsite in accordance with NCCI rules for Workers' Compensation payroll reporting.
Project	The construction project for which the Contractor has a written agreement with the Owner for the Work.
Subcontractor	Persons or companies providing construction services and/or materials and equipment for the Project under Contract with Contractor or under contract with a Subcontractor of any tier.
Subcontractor Supervisor	A Subcontractor's superintendent or primary supervisor for the Work on the Project or for a given Project who has the overall responsibility to see that the Work or Project is satisfactorily completed in accordance with the Contract.
Work	The construction and services, including all labor, material, equipment and services to be provided to complete the Subcontractor's obligations under the Contract Documents. Work also includes areas adjacent to the Project site or nearby described tracts of land where incidental operations are performed as specifically indicated in the Contract Documents.

III. Checklist for Enrollment

Forms required for enrollment must be received prior to arrival on the Jobsite. (Submit to Contractor within seven (7) days of award of Subcontract, receipt of a Notice to Proceed, or receipt of the Subcontract, whichever is earlier.)

- ❑ Subcontractor Enrollment Application-GL Only Program (Section XII *Forms*).
- ❑ Certificate(s) of Insurance (Section XII *Forms*).

IV. Administrative Contacts

Loss Control	Jim D. Miller Vice President, JE Dunn Construction Company 1001 Locust Street Kansas City, MO 64106 (816) 292-8740 jim.d.miller@jedunn.com
Claims Consultant	Holly Wright, Assistant Vice President Lockton Companies, LLC Claims Consultant (816) 960-9429 hwright@lockton.com
DCIP Director	Beth Brown, Insurance Program Manager JE Dunn Construction Company 1001 Locust Street Kansas City, MO 64106 (816) 292-8732 beth.brown@jedunn.com

V. Miscellaneous DCIP Requirements

Audit

If a Contract provides for audit, due to the GMP nature of the Contract, for change orders, or any other provision, and if during such audit costs are discovered which relate to onsite General Liability coverage, such costs shall be disallowed.

Warranty

Any work performed by an Enrolled Subcontractor, including warranty call back after the date of Substantial Completion, shall be done so under the Subcontractor's own insurance coverage and not under coverage provided by the DCIP.

Assignment and Transfer to Return of Premiums

Enrolled Subcontractors of any tier assign and transfer any and all rights, title, and all interest in any dividends, retrospective adjustments, participation payment and/or return of premiums, which may be payable to the Contractor under the DCIP. This Assignment and Transfer to Return of Premiums is in no way related to the Subcontractor's usual or traditional insurance programs.

VI. Insurance to be Furnished by Enrolled Subcontractors

Prior to enrollment and commencement of any Work on the Project, Enrolled Subcontractors, at their own expense, will furnish to the Contractor certificates of insurance evidencing insurance coverage as follows:

1. **Minimum Coverage and Limits**. Unless higher limits are required in the Contract Documents, Enrolled Subcontractors must procure, carry and maintain policies of insurance meeting the requirements and minimum limits listed below. Where appropriate, the required insurance limits may be provided through a combination of primary and excess/umbrella policies.

   A. **Workers' Compensation and Employer's Liability Insurance**. Enrolled Subcontractors must obtain and maintain Workers' Compensation Insurance to cover the statutory limits and requirements of the Workers' Compensation laws of the state or states in which the Enrolled Subcontractor's Work is performed. Enrolled Subcontractors must carry this insurance regardless of eligibility for waiver or exemption of coverage under a state law. Enrolled Subcontractors must also obtain and maintain Employer's Liability insurance, including Occupational Disease coverage, meeting the requirements and written for the following policy limits:

$500,000	**Bodily Injury Each Accident**
$500,000	**Each Employee**
$500,000	**Aggregate – Policy Limit**

   Such insurance must include "other states" insurance, so as to include all states not named on the declarations page of the insurance policy, except for the monopolistic states.

   Enrolled Subcontractors shall either provide workers' compensation coverage, or require proof of workers' compensation coverage from every person with whom it has a direct contract to perform construction work on the Project. The substance of this clause shall be included in all contracts the Enrolled Subcontractor enters into with lower tier subcontractors.

   B. **OFFSITE Commercial General Liability Insurance**. Enrolled Subcontractors must obtain and maintain Commercial General Liability Insurance for activities **not on the Jobsite** for the hazards of (i) construction operation, (ii) independent contractors, (iii) products/completed operations, (iv) explosion, collapse and underground (XCU), (v) broad form property damage, (vi) personal injury, (vii) premises operations, and (viii) broad form contractual liability and must be written for the following policy limits:

$1,000,000	**Per Occurrence, Combined Single Limit for Bodily Injury and Property Damage**
$1,000,000	**Personal & Advertising Injury**
$2,000,000	**General Aggregate (Per Project)**
$2,000,000	**Products/Completed Operations Aggregate**

   Enrolled Subcontractors must continue to maintain or renew annually Commercial General Liability, including products/completed operations, for a minimum of **the statute of repose for the state in which the project is located** from completion of the

Enrolled Subcontractors' Work on-site, or as required by the Contract Documents, whichever is longer.

C. **Commercial Automobile Liability Insurance**. Enrolled Subcontractors must obtain and maintain comprehensive automobile insurance covering all owned, non-owned and hired automobiles used in connection with the Enrolled Subcontractor's Work written for the following policy limits:

$1,000,000 Combined Single Limit for Bodily Injury and Property Damage per Accident

D. **Excess/Umbrella Liability**. Enrolled subcontractors must obtain and maintain Excess Liability coverage on an umbrella form following primary policy form (for Offsite General Liability, Automobile Liability and Employers Liability) written for the following policy limits:

$2,000,000 Per Occurrence
$2,000,000 Aggregate Limit

Enrolled Subcontractors must continue to maintain or renew annually Excess/Umbrella Liability for a minimum of **the statute of repose for the state in which the project is located** from completion of Enrolled Subcontractors' Work on-site, or as required by the Contract Documents, whichever is longer.

E. **Design/Professional Liability**. If any design responsibility is included in the Contract, Enrolled Subcontractors, or its designer, must purchase, and maintain or renew annually for a period of **the statute of repose for the state in which the project is located** after the date of Final Completion, insurance covering claims arising out of the performance or furnishing of Design Professional Services and for claims arising out of allegations of errors, omissions or negligent acts in connection with the Subcontract. The policy must be written for the following policy limits:

$1,000,000 Per Claim,
$1,000,000 Annual Aggregate Limit

F. **Commercial Watercraft and/or Aircraft Liability (if applicable)**. If watercraft or aircraft are used in connection with the Enrolled Subcontractor's Work, Enrolled Subcontractors must obtain and maintain Commercial Watercraft and/or Aircraft Liability insurance covering the use of all owned, non-owned, and hired watercraft and/or aircraft written with a combined bodily injury or property damage limit of **$50,000,000**.

G. **Equipment Policy**. Enrolled Subcontractors must provide property coverage for their equipment and tools brought onto the Project site.

VI. Insurance to be Furnished by Enrolled Subcontractors

2. **Conditions**

   A. **Insurance Primary**. Enrolled Subcontractors agree that all of its policies of insurance (including any General Liability and/or Excess/Umbrella Liability covering offsite activities and employees not excluded as set forth herein) are primary, non-contributory with and not in excess of the coverage of the insurance provided hereunder (whether primary, excess, or umbrella) or any other insurance available to the Additional Insured required by contract.

   B. **Severability of Interest**. Offsite General Liability, Excess/Umbrella Liability and Pollution Liability, if any, must be written to provide that, inasmuch as this policy is written to cover more than one insured, all terms, conditions, insuring agreements and endorsements, with the exception of limits of liability, must operate in the same manner as if there were a separate policy covering each insured.

   C. **Waiver of Subrogation**. All policies of insurance, as allowed by law and excluding Design/Professional Liability insurance, that are in any way related to the Work or services of the Project, including those that are secured and maintained by consultants and lower-tier subcontractors, must include a provision providing that each party and its insurance carrier waive all rights of recovery under subrogation or otherwise against the Additional Insureds.

   D. **Additional Insureds**. Subcontractor furnished insurance (except Workers' Compensation Insurance and Professional Liability, if applicable) must include**, Owner; Contractor, Architect (if required in the Contract Documents)**; and any other person or entity required by the Contract Documents, and all their assigns, subsidiaries and affiliates as additional insureds as their respective interest may appear ("Additional Insureds"). Additional Insured status must be provided for ongoing operations and completed operations. Additional Insured endorsements are subject to Contractors review and approval when provided with Certificate of Insurance. Additional Insured endorsements may not contain time limitation less than required by Contract, nor may it alter limit coverage provided to the Additional Insured.

   E. **Cancellation Notice**. All insurance certificates and policies shall not be canceled, non-renewed or materially changed without the Subcontractor providing sixty (60) days prior written notice to Contractor.

3. **Lower-Tier Subcontractors' Insurance**. Subcontractor must require all lower-tier subcontractors providing equipment, materials or services directly to Subcontractor in connection with the Subcontractor's Work to obtain, maintain and keep in force coverage in accordance with these insurance requirements. Subcontractor must obtain certificates of insurance evidencing such coverage and provide Contractor with such certificates upon request. Subcontractor will not be excused from its obligations to cause such lower-tier subcontractor to meet the insurance coverage requirements set forth under this section unless

Subcontractor obtained in writing from Contractor a waiver, which must be effective only as to such requirements and for such lower-tier subcontractors specifically identified therein.

Subcontractor shall verify that their lower tier Subcontractors have met the Worker's Compensation insurance requirements, as required by law, including but not limited to collecting all required certificates of insurance.

4. General Requirements

A. Insurance certificates and endorsements complying with these requirements must be received by Contractor or Subcontractor prior to commencement of Subcontractor's Work on the Project and will be a condition to any payment.

B. All insurance is to be issued by companies acceptable to Contractor but must be provided by companies having at least an A.M. Best rating of A-VII or better and authorized in the state in which the project is located.

C. Contractor reserves the right to require that Subcontractor provide certified copies of any and all insurance policies and endorsements.

D. Certificates of Insurance are subject to the approval of Contractor. However, any acceptance of a certificate by Contractor does not limit or relieve Subcontractor of its obligations under the Contract or waive Subcontractor's obligation to maintain such insurance.

E. Contractor may take such steps as necessary to assure Subcontractor's compliance with the insurance requirements. In the event Subcontractor fails to obtain and maintain the policies of insurance meeting the requirements and minimum limits identified above, Contractor may obtain and maintain such coverage and recover the cost from Subcontractor.

F. The policies of insurance required above must contain no exclusion for work expressly within Subcontractor's scope of work (e.g., EIFS, asbestos, etc.) unless Subcontractor has a separate policy providing such coverage and provides evidence of such coverage with limits of liability comparable with above stated limits.

G. The required coverage and limits referred to and set forth herein do not affect or limit Subcontractor's liability with respect to its Contract and its performance or the coverage as an Additional Insured.

VII. Insurance to be Furnished by Non-enrolled Subcontractors

Non-enrolled subcontractors and/or suppliers (Excluded Parties) shall not be covered by insurance provided through the DCIP. Instead all Non-enrolled parties in the DCIP shall obtain and maintain all insurance coverage specified below until all of their obligations have been discharged, including any warranty periods under their contract .

1. **Minimum Coverage and Limits**. Unless higher limits are required in the Contract Documents, Non-enrolled Subcontractors must procure, carry and maintain policies of insurance meeting the requirements and minimum limits listed below. Where appropriate, the required insurance limits may be provided through a combination of primary and excess/umbrella policies.

   A. **Workers' Compensation and Employer's Liability Insurance**. Non-enrolled Subcontractors must obtain and maintain Workers' Compensation Insurance to cover the statutory limits and requirements of the Workers' Compensation laws of the state or states in which the Non-enrolled Subcontractor's Work is performed. Non-enrolled Subcontractors must carry this insurance regardless of eligibility for waiver or exemption of coverage under a state law. Non-enrolled Subcontractors must also obtain and maintain Employer's Liability insurance, including Occupational Disease coverage, meeting the requirements and written for the following policy limits:

   $500,000 Bodily Injury Each Accident
   $500,000 Each Employee
   $500,000 Aggregate – Policy Limit

   Such insurance must include "other states" insurance, so as to include all states not named on the declarations page of the insurance policy, except for the monopolistic states.

   Non-enrolled Subcontractors shall either provide workers' compensation coverage, or require proof of workers' compensation coverage from, every person with whom it has a direct contract to perform construction work on the Project. This substance of this clause shall be included in all contracts Non-enrolled Subcontractors enter in to with lower tier subcontractors.

   B. **Commercial General Liability Insurance**. Non-enrolled Subcontractors must obtain and maintain Commercial General Liability Insurance for the hazards of (i) construction operation, (ii) independent contractors, (iii) products/completed operations, (iv) explosion, collapse and underground (XCU), (v) broad form property damage, (vi) personal injury, (vii) premises operations, and (viii) broad form contractual liability and must be written for the following policy limits:

   $1,000,000 Per Occurrence, Combined Single Limit for Bodily Injury and Property Damage
   $1,000,000 Personal & Advertising Injury
   $2,000,000 General Aggregate (Per Project)
   $2,000,000 Products/Completed Operations Aggregate

   Non-enrolled Subcontractors must continue to maintain or renew annually Commercial General Liability, including products/completed operations, for a minimum of **the statute of repose for the state in which the project is located** from completion of Non-

enrolled Subcontractors' Work on-site, or as required by the Contract Documents, whichever is longer.

C. **Commercial Automobile Liability Insurance**. Non-enrolled subcontractors must obtain and maintain comprehensive automobile insurance covering all owned, non-owned and hired automobiles used in connection with the Non-enrolled Subcontractor's Work written for the following policy limits:

$1,000,000 Combined Single Limit for Bodily Injury and Property Damage per Accident

D. **Excess/Umbrella Liability**. Non-enrolled Subcontractors must obtain and maintain Excess Liability coverage on an umbrella form following primary policy form (General Liability, Automobile Liability and Employers Liability) written for the following policy limits:

$2,000,000 Per Occurrence
$2,000,000 Aggregate Limit

Non-enrolled Subcontractors must continue to maintain or renew annually Excess/Umbrella Liability for a minimum of **the statute of repose for the state in which the project is located** from completion of Non-enrolled Subcontractors' Work on-site, or as required by the Contract Documents, whichever is longer.

E. **Design Liability**. If any design responsibility is included in the Contract, Non-enrolled Subcontractors, or their designers, must purchase, and maintain or renew annually for a period of **the statute of repose for the state in which the project is located** after the date of Final Completion, insurance covering claims arising out of the performance or furnishing of Design Professional Services and for claims arising out of allegations of errors, omissions or negligent acts in connection with the Subcontract. The policy must be written for the following policy limits:

$1,000,000 Per Claim,
$1,000,000 Annual Aggregate Limit

F. **Commercial Watercraft and/or Aircraft Liability (if applicable)**. If watercraft or aircraft are used in connection with the Non-enrolled Subcontractors' Work, Non-enroll Subcontractors must obtain and maintain Commercial Watercraft and/or Aircraft Liability insurance covering the use of all owned, non-owned, and hired watercraft and/or aircraft written with a combined bodily injury or property damage limit of **$50,000,000**.

G. **Equipment Policy**. Non-enrolled Subcontractors must provide property coverage for their equipment and tools brought onto the Project site.

H. **Pollution Liability (if applicable to Subcontractor's scope of work)**. The Contractor will determine, on an individual contract basis, what pollution coverage shall be carried and what limits will be required. At a minimum, Non-enrolled Subcontractors must furnish insurance providing coverage for Pollution Liability in an amount not less than **$2,000,000 per occurrence / $2,000,000 Annual Aggregate**, complying with the requirements of the Contract Documents.

2. **Conditions**

A. **Insurance Primary**. Non-enrolled Subcontractors agree that all of its policies of insurance are primary, non-contributory with and not in excess of Contractor's primary, excess or umbrella insurance or any other insurance available to the Contractor.

B. **Severability of Interest**. General Liability, Excess/Umbrella Liability and Pollution Liability, if any, must be written to provide that, inasmuch as this policy is written to cover more than one insured, all terms, conditions, insuring agreements and endorsements, with the exception of limits of liability, must operate in the same manner as if there were a separate policy covering each insured.

C. **Waiver of Subrogation**. All policies of insurance, as allowed by law and excluding Professional Liability insurance, that are in any way related to the Work or services of the Project, including those that are secured and maintained by consultants and lower-tier subcontractors, must include a provision providing that each party and its insurance carrier waive all rights of recovery under subrogation or otherwise against the Additional Insureds.

D. **Additional Insureds**. Subcontractor furnished insurance (except Workers' Compensation Insurance and Professional Liability, if applicable) must include**, Owner; Contractor, Architect (if required in the Contract Documents)**; and any other person or entity required by the Contract Documents, and all their assigns, subsidiaries and affiliates as additional insureds as their respective interest may appear ("Additional Insureds"). Additional Insured status must be provided for ongoing operations and completed operations. The additional insured endorsement shall be ISO form CG 20 10 10 01 and CG 20 37 10 01 edition or its equivalent.

E. **Cancellation Notice**. All insurance certificates and policies shall not be canceled, non-renewed or materially changed without providing sixty (60) days prior written notice to Contractor.

3. **Lower-Tier Subcontractors' Insurance**. Subcontractor must require all lower-tier subcontractors providing equipment, materials or services directly to Subcontractor in connection with the Subcontractor's Work to obtain, maintain and keep in force coverage in accordance with these insurance requirements. Subcontractor must obtain certificates of insurance evidencing such coverage and provide Contractor with such certificates upon

request. Subcontractor will not be excused from its obligations to cause such lower-tier subcontractor to meet the insurance coverage requirements set forth under this section unless Subcontractor obtained in writing from Contractor a waiver, which must be effective only as to such requirements and for such lower-tier subcontractors specifically identified therein.

Subcontractor shall verify that their lower tier Subcontractors have met the Worker's Compensation insurance requirements, as required by law, including but not limited to collecting all required certificates of insurance.

4. General Requirements

A. Insurance certificates and endorsements complying with these requirements must be received by Contractor or Subcontractor prior to commencement of Subcontractor's Work on the Project and will be a condition to any payment.

B. All insurance is to be issued by companies acceptable to Contractor but must be provided by companies having at least an A.M. Best rating of A-VII or better and authorized in the state in which the project is located.

C. Contractor reserves the right to require that Subcontractor provide certified copies of any and all insurance policies and endorsements.

D. Certificates of Insurance are subject to the approval of Contractor. However, any acceptance of a certificate by Contractor does not limit or relieve Subcontractor of its obligations under the Contract or waive Subcontractor's obligation to maintain such insurance.

E. Contractor may take such steps as necessary to assure Subcontractor's compliance with the insurance requirements. In the event Subcontractor fails to obtain and maintain the policies of insurance meeting the requirements and minimum limits identified above, Contractor may obtain and maintain such coverage and recover the cost from Subcontractor.

F. The policies of insurance required above must contain no exclusion for work expressly within Subcontractor's scope of work (e.g., EIFS, asbestos, etc.) unless Subcontractor has a separate policy providing such coverage and provides evidence of such coverage with limits of liability comparable with above stated limits.

G. The required coverage and limits referred to and set forth herein do not affect or limit Subcontractor's liability with respect to its Contract and its performance or the coverage as an Additional Insured.

VIII. Termination of DCIP and Alternate Insurance

In the event Contractor, for any reason, is unable to provide or, after commencement of Work, elects not to provide or to continue to provide the insurance as specified in Section IX of this Manual then, upon thirty (30) days written notice from Contractor or its designee, the following shall be required of each Enrolled Subcontractor.

The parties previously enrolled or to be enrolled in the DCIP shall obtain replacement insurance with the minimum coverage and limits set forth in Section VII or as otherwise required by Contractor, with insurers acceptable to Contractor. Such insurance shall be obtained before the DCIP coverage terminates, and Subcontractors shall provide Contractor with Certificates of Insurance or certified copies of policies prior to that date. Subcontractors shall also require all lower tier subcontractors to obtain such insurance. Contractor shall issue the Subcontractor a Change Order which reflects the cost of the additional premiums realized by Subcontractor and its lower tier subcontractors for such replacement insurance.

IX. DCIP Insurance Provided for Enrolled Subcontractors

Contractor will, at its sole expense, maintain the following types of insurance under the DCIP:

Commercial General Liability

Coverage is written on an "occurrence" basis. The policy includes:

- ❑ Premises and Operations coverage
- ❑ Completed Operations coverage based on the State statute of repose, up to a maximum of ten (10) years, after:
  - Substantial completion of the Jobsite Work, or
  - Acceptance by the Owner, or
  - Project is put to its intended use.
- ❑ Personal Injury Liability.
- ❑ Contractual coverage for liability assumed under an insured contract as defined by the insurance policy.
- ❑ Broad form property damage.
- ❑ Independent contractors.
- ❑ Explosion, Collapse, Underground (XCU).
- ❑ Employees are insured's under the policy.
- ❑ Separation of insured's, as defined by the standard Insurance Service Office (ISO) policy form.
- ❑ Stop Gap coverage, where applicable.

Projects with a value between $1M and $15M:

Coverage is provided with combined limits of $5,000,000 per occurrence and $10,000,000 General Aggregate and $10,000,000 Completed Operations. The limits of liability apply for all projects enrolled in the DCIP and are shared by Contractor and all Enrolled Subcontractors. General Aggregate limits shall be re-instated annually.

Projects with a value exceeding $15M:

Coverage is provided with combined limits of $5,000,000 per occurrence, $5,000,000 General Aggregate, and $5,000,000 Completed Operations. The limits of liability are shared by Contractor and all Enrolled Subcontractors. Aggregates are per project. General Aggregate limits shall be re-instated annually.

IX. DCIP Insurance Provided for Enrolled Subcontractors

Other Notes:

The policy will be primary for claims arising from Work under contract at the Jobsite and noncontributory with any other insurance carried by the Subcontractor for work performed at the Jobsite.

Significant exclusions:

1. Engineers and Architects Professional Liability **exclusion**
2. Absolute Pollution **exclusion**
3. Asbestos **exclusion**
4. Fungus/mold **exclusion**
5. Terrorism **exclusion**

*** Refer to policy for additional terms, exclusions, and conditions. (available from DCIP Administrator upon request)**

Umbrella/Excess **Coverage varies depending on project value. The policy includes:**

Projects with a value between $1M and $15M:

Umbrella Coverage is provided with combined limits of $25,000,000 per occurrence and $25,000,000 General Aggregate and $25,000,000 Completed Operations. The limits of liability apply for all projects enrolled in the DCIP and are shared by Contractor and all Enrolled Subcontractors. General Aggregate limits shall be re-instated annually.

Excess Coverage is provided with combined limits of $20,000,000 per occurrence and $20,000,000 General Aggregate and $20,000,000 Completed Operations. The limits of liability apply for all projects enrolled in the DCIP and are shared by Contractor and all Enrolled Subcontractors. General Aggregate limits shall be re-instated annually.

Projects with a value exceeding $15M:

Umbrella Coverage is provided with combined limits of $25,000,000 per occurrence, $25,000,000 General Aggregate, and $25,000,000 Completed Operations. The limits of liability are shared by Contractor and all Enrolled Subcontractors. Aggregates are per project. General Aggregate limits shall be re-instated annually.

Excess Coverage is provided with combined limits of $15,000,000 per occurrence, $15,000,000 General Aggregate and $15,000,000 Completed Operations are shared by Contractor and all Enrolled Subcontractors. Aggregates are per project. General Aggregate limits shall be re-instated annually.

IX. DCIP Insurance Provided for Enrolled Subcontractors

Deductible

Subcontractors are responsible for payment of a deductible up to $2,500.00 per occurrence for general liability property damage claims.

Coverage

Umbrella/Excess shall not provide excess coverage for Employers Liability, Automobile Liability or any type of Liability coverage other than onsite General Liability coverage.

*** Refer to policy for additional terms, exclusions, and conditions. (Available from DCIP Administrator upon request)**

DCIP Insurance Carriers

General Liability -	New Hampshire Insurance Company / Lexington Company
Umbrella Liability -	Chartis Specialty Insurance Company
Excess Liability -	Lexington Insurance Company

Providing the insurance described in this Section IX shall in no way relieve, limit, or be construed to relieve or limit the Subcontractors of any responsibility or obligation whatsoever otherwise imposed by their Contract or by law.

Any type of insurance or increase of limits not described above, which the Subcontractor requires for its own protection or on account of statute, shall be its own responsibility and at its own expense.

X. Claim Procedures

1. **General Liability Claims – Enrolled Subcontractors.** It is the responsibility of all Enrolled Subcontractors to notify the Contractor of all claims **within 24 hours** of the occurrence by following the procedures below. **Failure to timely notify Contractor of any and all claims could be grounds for denial of coverage**.

   a) Immediately notify the Contractor's superintendent or project manager of any property damage or injury involving a third party.

   b) An Enrolled Subcontractor that wishes to submit a claim involving personal injury or property damage directly shall complete a Claims Reporting Form (Section XII *Forms*) and email it to claims@jedunn.com or fax to 816-581-3353 **within 24 hours** of the occurrence).

   c) In the event the Subcontractor is served with a summons or other legal notice involving a claim of personal injury or property damage to a third party related to the Project, a copy of the summons, complaint, or other legal notice shall be forwarded **within 24 hours** of its receipt to the Contractor's project manager with a PDF copy to claims@jedunn.com. If not previously submitted, a Claim Reporting Form should also be completed, as described above. **Delay in reporting a summons or other legal notice could result in a default judgment against the Subcontractor.**

   d) Subcontractors shall assist in completing any paperwork (including the Claim Reporting Form) and undertaking any investigation of the injury or property damage. Subcontractor should be prepared to provide:
      - Date, time, and location of the occurrence
      - Name, address and phone number of the injured person(s) and/or owner(s) of the damaged property
      - Description of the damaged property, if any
      - Name, address and phone number of witness(es)

2. **General Liability Claims – Non-enrolled Subcontractors.** Non-enrolled Subcontractors shall immediately report any property damage or injury involving a third party directly to their own insurance carrier/broker by following its usual procedures. Non-enrolled Subcontractors shall likewise notify Contractor's Jobsite superintendent or project manager of any such occurrence and shall, on request, confirm to Contractor that satisfactory reporting to the insurance carrier has occurred.

3. Enrolled Subcontractor's, on a quarterly basis, may request a reporting of the participant's respective claims details and loss information. An Enrolled Subcontractor may submit their request by email to claims@jedunn.com or fax to 816-581-3353.

XI. Project Safety Program

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1.0 INTRODUCTION & POLICY STATEMENT

The project team is totally committed to providing each worker a safe and healthful workplace. To accomplish this objective, it is necessary that an effective and understandable safety and health policy be defined and enforced consistent with nationally recognized standards.

The success of the safety program requires the combined efforts of the Contractor, Subcontractors and all employees. It is very important that the team addresses this objective in order to maintain the safest and most successful projects in the construction industry.

The Contractor's national Safety and Health Program can be found at http://www.jedunn.com/spq/safetyprogram/. Adherence to the Safety and Health Program **is a requirement** for all of the Contractor's partners on all of its projects.

Additionally, the Contractor and DCIP Administrator have prepared DCIP-specific Project Safety Requirements. The Safety and Health Program, as well as the DCIP-specific Project Safety Requirements, are binding terms for all Enrolled and Non-enrolled Subcontractors. **Together, these two items comprise the core of the *Project Safety Program* for any DCIP Project.**

It is a requirement of all Subcontractors that the Safety and Health Program, including the DCIP-specific Project Safety Requirements and any contract provisions necessary to operate and enforce the Project Safety Program successfully, be included in all Project contracts and subcontracts to the lowest tier. The Contractor shall be responsible for the proper execution of the project loss control program.

It is not the intention of the Project Safety Program to be all-inclusive. It is however, an attempt to provide the Subcontractors and their employees with basic safety and health requirements as well as provide requirements that may be in addition to Occupational Safety and Health Act (OSHA) regulations. It is incumbent on all parties to follow the best and highest safety practices in all aspects of their activities at all times.

In the event of a conflict and/or ambiguity between various statutes, law, regulations or standards and this Project Safety Program, interpretation by the Program Safety Manager will be final.

1.1. Definitions

The definitions set forth in Section II of this Manual shall apply to the Project Safety Program. The following additional definitions also apply:

A. Project Safety Program: shall be comprised of the Contractor's national Safety and Health Program, the DCIP-specific Project Safety Requirements, OSHA regulations, other applicable regulations (federal, state or local), and any contract provisions necessary to operate and enforce the program.

B. Project Safety Manager: the person(s) designated by the Contractor as having the responsibility to monitor the Project Safety Program.

C. Subcontractor Safety Representative: the individual on the payroll for each Subcontractor responsible for monitoring compliance with the Project Safety Program and the respective Subcontractor's own safety plan.

2.0 RESPONSIBILITIES

Subcontractors shall comply with the Project Safety Program. Each Subcontractor shall retain primary responsibility for its work and its employees. Each Subcontractor shall also be responsible for its Subcontractors' compliance with the Project Safety Program.

The Subcontractor shall communicate the contents of this Project Safety Program to their workers.

Subcontractor's personnel, employees, suppliers, consultants, agents and visitors shall, when upon or about the Project site, observe and comply with the strictest provisions of all federal, state, or local safety, fire, and environmental laws, rules, and regulations and as otherwise prescribed by the Project Safety Program or any other legal requirements.

Failure to comply with the Project Safety Program will be considered as noncompliance with the Contract and may result in remedial action, including withholding of payment of any sums due and/or termination of the Subcontractor and from the site.

Subcontractors shall take all necessary precautions to protect the public from any hazards involving safety and health arising from their scope of work. All construction activities shall be isolated from the public to the greatest extent possible.

Each Subcontractor will be responsible for the payment of all fines and/or claims for damages levied against them for safety or environmental violations or deficiencies related to the conduct of their employees or Work.

The Contractor and/or the Project Safety Manager shall have the authority to stop work in progress when necessary to enforce mandatory safety requirements. The Contractor shall not be liable for any damages experienced by Subcontractor due to stoppage. No part of the time lost due to any such stop work order shall be made the subject of a claim for extension of time or increased costs by Subcontractor.

Each Subcontractor is required to name an individual on its payroll as Subcontractor Safety Representative. Each Subcontractor Safety Representative shall have the experience, ability, and authority to act on the respective Subcontractor's behalf in matters of safety on the Project. This individual shall, at a minimum, be certified in the OSHA 10 Hour hazard recognition course within 60 days of Contract award. The Subcontractor Safety Representatives shall be allowed adequate time to conduct all necessary safety activities required by the Project Safety Program for the successful operation of the Safety Program. Costs of Subcontractor's participation in the activities are the responsibility of the Subcontractor. Selection of these representatives is subject to approval of the Project Safety Manager. Each Subcontractor Safety Representative will become a member of the Project Safety Committee(s) and will be expected to attend all committee meetings called by the

XI. Project Safety Program

Project Safety Manager. The Subcontractor agrees to make their designated Subcontractor Safety Representative available for additional specialized safety training over and above the normal duties stated above, as deemed appropriate by the Project Safety Manager. Such additional availability will not exceed 20 hours per year.

Subcontractors shall provide the following items:

- A copy of the Subcontractor's safety plan;
- A copy of their OSHA Hazard Communication Program;
- A list of the chemicals used on the Jobsite in the performance of the Work;
- Copies of Material Safety Data Sheets (MSDS) for each covered chemical used on the Jobsite;
- Documentation for any required training for Project employees as it applies to their Work;
- Copies of accident investigation results for any accidents occurring on the Project site;
- Records, including the OSHA 300 log, of occupational injuries and illnesses that occur on the Jobsite;
- Records of the disposal of chemicals/materials or any other hazardous wastes used on the Jobsite in the performance of the Contract; and
- Proof of compliance with storm water discharge environmental regulations. (The Contractor, and its option, may choose to create and maintain this documentation for the Subcontractors.)

Any employee involved in an accident or incident that results in an injury or property damage will be **required** to submit to a **post-incident drug test**. In cases of an on-the-job injury, such tests will be administrated at the time an injured worker receives medical treatment resulting from the incident. Testing is not limited to the injured employee but may be required of all or any person(s) involved in the incident as required by the Project Safety Manager. The testing methods, procedures, and protocols utilized will be subject to approval by the Project Safety Manager. The cost of the drug test is the responsibility of the Subcontractor.

The Subcontractor shall provide, or cause to be provided, to each worker on the Jobsite the proper safety equipment for the duties being performed by that worker and will not permit any worker on the job site who fails or refuses to use the same.

In addition to task specific safety training, each Subcontractor shall conduct weekly toolbox talks. Safety meetings shall be documented by subject, date and time, and attendees' names. A copy of the toolbox talk must be transmitted weekly to the Project Safety Manager. If the limited number of employees of the Subcontractor on site makes such a talk impractical, such employees shall attend the weekly toolbox talk scheduled by the Contractor. Various training materials are available through trade associations, insurance companies, and the Project Safety Manager.

Any Subcontractor that is involved in extra hazardous work, as designated by the Project Safety Manager, will be required to provide notification of the start of such activity to the Project Safety Manager prior to the commencement of such activity. Such activities include,

but are not limited to, critical lifts with cranes, hot work, excavation, working at heights, and confined space entry.

The Contractor may request the removal from the project of any Subcontractor or Sub-subcontractor personnel, management, supervision, or craft for noncompliance with the Project Safety Program or non-correction of hazards. This request for removal may also apply to any individual who, in the opinion of the Contractor and the Project Safety Manager, exhibits an unsafe behavior attitude. The Contractor and/or the Project Safety Manager shall not be liable for any damages experienced by any Subcontractor due to removal of Subcontractor's personnel, management, supervision, or craft from the Site.

Subcontractors are required to discipline employees who violate established rules and regulations of the Project. The Subcontractor's disciplinary procedures will meet or exceed those provided for in the Project Safety Program.

3.0 HAZARD NOTIFICATION

Imminent danger situations brought to the attention of the Contractor shall be corrected immediately. Other unsafe conditions will be conveyed via a written hazard alert. The Subcontractor, within one (1) working day of issuance, must correct the hazards and/or unsafe acts or remove the defective equipment from the Project. Upon expiration of the one working day (24-hour period), the Contractor may stop work until the hazard is abated. Lost time, lost productivity, or other expenses as a result of this hazard and/or safety violation will be at the sole cost of the Subcontractor.

Subcontractors encountering safety hazards beyond their control or expertise to correct are encouraged to notify the Contractor of their concerns. Failure on the part of the Contractor to observe or deter unsafe work practices shall in no way relieve any Subcontractor of its safety responsibilities. Lack of cooperation in complying with these requirements will be considered non-compliance with the Contract and may result in a remedial action including, but not limited to, withholding of payments due the Subcontractor or correction of the hazard by the Contractor with the cost deducted from the Subcontractor's Contract balance.

XII. Enrollment Forms

A. Subcontractor Enrollment Application-GL Only Program

B. Certificate of Insurance – Enrolled Subcontractors

C. Certificate of Insurance – Non-enrolled Subcontractors

D. Claim Reporting Form

XII. Enrollment Forms

Dunn Controlled Insurance Program
Subcontractor Enrollment Application—GL Only Program

Prime Subcontractor

Project Name: _____

Company Name: _____

Enrollment Contact: _____ _____ _____
Name *Phone* *Fax*
E-mail Address: _____

Company Address: _____
Street Address
_____
City *State* *Zip*

Federal Employer's Identification Number (FEIN): _____ Contract Value: _____

Scope of Work: _____ Estimated Start Date: _____

Who holds your contract (J.E. Dunn or other)? Specify: _____

If you are subcontracting any of your work, please fill out the following. Please keep in mind YOU will be held responsible per contract for notification of any and all additional subcontracts issued under YOU. This means at any tiers.

SUB-SUBCONTRACTOR ONE:

Company Name: _____

Enrollment Contact: _____ _____ _____
Name *Phone* *Fax*
E-mail Address: _____

Company Address: _____
Street Address
_____
City *State* *Zip*

Federal Employer's Identification Number (FEIN): _____ Contract Value: _____

Scope of Work: _____ Estimated Start Date: _____

SUB-SUBCONTRACTOR TWO:

Company Name: _____

Enrollment Contact: _____ _____ _____
Name *Phone* *Fax*
E-mail Address: _____

Company Address: _____
Street Address
_____
City *State* *Zip*

Federal Employer's Identification Number (FEIN): _____ Contract Value: _____

Scope of Work: _____ Estimated Start Date: _____

If you have additional sub-subcontractors, please submit them on an attached sheet with this application.

Signature of Company Officer: _____ Date: _____

This form must be faxed or mailed to: **Insert Dunn Company address/contact information here.**

XII. Enrollment Forms

Sample DCIP GL Only Enrolled Subcontractors

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME: BROKER'S INFORMATION	
BROKER'S NAME (NAME AND ADDRESS)	PHONE (A/C, No, Ext):	FAX (A/C, No):
	E-MAIL ADDRESS:	
	PRODUCER CUSTOMER ID #:	
	INSURER(S) AFFORDING COVERAGE	NAIC #
INSURED	INSURER A : INSURANCE COMPANY	
SUBCONTRACTOR (NAME AND ADDRESS)	INSURER B :	
	INSURER C :	
	INSURER D :	

COVERAGES — CERTIFICATE NUMBER: (COMPLETED BY BROKER) — REVISION NUMBER: (COMPLETED BY BROKER)

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	GENERAL LIABILITY ☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR ☒ For Offsite Coverage ☒ outside of the DCIP GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☒ PRO-JECT ☐ LOC	☐	☐				EACH OCCURRENCE	$ 1,000,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$ 1,000,000
							GENERAL AGGREGATE	$ 2,000,000
							PRODUCTS - COMP/OP AGG	$ 2,000,000
								$
A	AUTOMOBILE LIABILITY ☒ ANY AUTO ☐ ALL OWNED AUTOS ☐ SCHEDULED AUTOS ☒ HIRED AUTOS ☒ NON-OWNED AUTOS ☐	☐	☐				COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
							BODILY INJURY (Per person)	$
							BODILY INJURY (Per accident)	$
							PROPERTY DAMAGE (Per accident)	$
								$
								$
A	☐ UMBRELLA LIAB ☒ OCCUR ☐ EXCESS LIAB ☐ CLAIMS-MADE ☐ DEDUCTIBLE ☐ RETENTION $	☐	☐				EACH OCCURRENCE	$ 2,000,000
							AGGREGATE	$ 2,000,000
								$
								$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y / N ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A	☐	For			☒ WC STATU-TORY LIMITS ☐ OTH-ER	
							E.L. EACH ACCIDENT	$ 500,000
							E.L. DISEASE - EA EMPLOYEE	$ 500,000
							E.L. DISEASE - POLICY LIMIT	$ 500,000
		☐	☐					

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

DUNN PROJECT NUMBER/NAME: MN State Capitol Interior Renovation #13063900

WORKERS COMPENSATION, GENERAL LIABILITY & AUTOMOBILE LIABILITY CONTAIN A WAIVER OF SUBROGATION (WHERE ALLOWED BY LAW)

Option I: For GL and Auto ongoing and completed operations, insured's Blanket Additional Insured Endorsement provides additional insured coverage as required by written contract.
Option II: For GL and Auto ongoing and completed operations, additional insured status is provided for: [Insert list of Additional Insureds].
JE Dunn Construction Company, State of MN & HGA Architects

CERTIFICATE HOLDER	CANCELLATION
J.E. DUNN CONSTRUCTION COMPANY NOTE TO BROKER/AGENT: INSERT PROPER DUNN COMPANY NAME AND ADDRESS HERE (SEE ATTACHED)]	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE

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XII. Enrollment Forms

Sample DCIP Non-Enrolled Subcontractors

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

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PRODUCER

BROKER'S NAME
(NAME AND ADDRESS)

CONTACT NAME: BROKER'S INFORMATION
PHONE (A/C, No, Ext): | FAX (A/C, No):
E-MAIL ADDRESS:
PRODUCER CUSTOMER ID #:

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : INSURANCE COMPANY	
INSURER B :	
INSURER C :	
INSURER D :	

INSURED

SUBCONTRACTOR
(NAME AND ADDRESS)

COVERAGES — CERTIFICATE NUMBER: (COMPLETED BY BROKER) — REVISION NUMBER: (COMPLETED BY BROKER)

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	GENERAL LIABILITY ☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☒ PRO-JECT ☐ LOC	☐	☐				EACH OCCURRENCE	$ 1,000,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$ 1,000,000
							GENERAL AGGREGATE	$ 2,000,000
							PRODUCTS - COMP/OP AGG	$ 2,000,000
								$
A	AUTOMOBILE LIABILITY ☒ ANY AUTO ☐ ALL OWNED AUTOS ☐ SCHEDULED AUTOS ☒ HIRED AUTOS ☒ NON-OWNED AUTOS ☐	☐	☐				COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
							BODILY INJURY (Per person)	$
							BODILY INJURY (Per accident)	$
							PROPERTY DAMAGE (Per accident)	$
								$
								$
A	☐ UMBRELLA LIAB ☒ OCCUR ☐ EXCESS LIAB ☐ CLAIMS-MADE ☐ DEDUCTIBLE ☐ RETENTION $	☐	☐				EACH OCCURRENCE	$ 2,000,000
							AGGREGATE	$ 2,000,000
								$
								$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y / N N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A	☐				☒ WC STATU-TORY LIMITS ☐ OTH-ER	
							E.L. EACH ACCIDENT	$ 500,000
							E.L. DISEASE - EA EMPLOYEE	$ 500,000
							E.L. DISEASE - POLICY LIMIT	$ 500,000
		☐	☐					

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

PROJECT NUMBER / NAME: MN State Capitol Interior Renovation #13063900

WORKERS COMPENSATION, GENERAL LIABILITY & AUTOMOBILE LIABILITY CONTAIN A WAIVER OF SUBROGATION (WHERE ALLOWED BY LAW)

Option I: For GL and Auto ongoing and completed operations, insured's Blanket Additional Insured Endorsement provides additional insured coverage as required by written contract.
Option II: For GL and Auto ongoing and completed operations, additional insured status is provided for: (Insert list of Additional Insureds)

JE Dunn Construction Company, State of MN & HGA Architects

CERTIFICATE HOLDER

J.E. DUNN CONSTRUCTION COMPANY
[NOTE TO BROKER/AGENT: INSERT PROPER DUNN COMPANY NAME AND ADDRESS HERE (SEE ATTACHED)]

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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ACORD 25 (2009/09)

XII. Enrollment Forms

JE DUNN CONSTRUCTION COMPANY
OFFICE LOCATIONS:

Midwest Region:
JE Dunn Construction Company
1001 Locust, Kansas City, MO 64106

9855 W. 78th Street Suite 270, Eden Prairie, Minnesota 55344

1135 E. Lakewood, Suite 120, Springfield, MO 65810

433 S Kansas Avenue, Topeka, KS 66603

5959 Village View, Suite 100, West Des Moines, IA 50266

17110 Marcy, Suite LL01, Omaha, NE 68118

501 E Broadway Ste 1, Williston, ND 58801

East Region (RJ Griffin & Company):
JE Dunn Construction Company
800 Mount Vernon Highway, Suite 200, Atlanta GA 30328

12 Cadillac Drive, Suite 100, Brentwood, TN 37027

6101 Carnegie Blvd, Suite 400, Charlotte, NC 28209

945 Broad Street, Suite 310, Augusta, GA 30901

Rives E. Worrell, JE Dunn Construction Co., 708 Christopher Dr., PO Box 13672, Savannah, GA 31406

South Central Region:
JE Dunn Construction Company
901 S Mopac Expressway, Barton Oaks Plaza II, Suite 375, Austin TX 78746

16000 N Dallas Parkway, Suite 500, Dallas, TX 75248

10350 Richmond Avenue, Suite 900, Houston TX 77042

10900 Hefner Pointe Dr., Suite 305, Oklahoma City, 73120

West Region:
JE Dunn Construction Company
1120 West Morena Avenue, Colorado Springs, CO 80905

Colorado Center – Tower One, 2000 S Colorado Blvd Suite 12000, Denver, CO 80222

2000 W University Dr, Tempe, AZ 85281

437 North Columbia Blvd, Portland OR 97217

XII. Enrollment Forms

CLAIM REPORTING FORM

(Use for all claims except Work Comp and Auto)

Project name: _____ JE Dunn Project # _____ Project Start Date _____

Project Address: _____ City: _____ State/Zip: _____

Supervisor (Name and Phone #) _____

Date of incident: _____ Time of Incident: _____

Brief Description Of Incident: (Describe events, conditions, or action taken. Give **facts** only.)

_____

_____

_____

_____

_____

List of person(s) involved or witness to the incident:

Name	Company	Phone#	Claimant (C), Employee (E), Witness (W) or Other (O)

Person completing the form:

Name (print)	Signature	Company/Employer	Phone #	Date of Report

For Internal Use Only: ☐ "Notice only"

Coverage ☐ GL ☐ BR ☐ Other:

GL Program ☐ Traditional ☐ DCIP Dunn I Dunn II Dunn III 1-15 Over 15

Office Code: _____ Project Code: _____ Contractor Code: _____

Please email this completed form **within 24 hours** of the incident to claims@jedunn.com or fax to 816-581-3353.

SECTION 00 73 36
EQUAL OPPORTUNITY

GENERAL: Subcontractors and its sub-subcontractors and suppliers shall not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. The Subcontractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Subcontractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

PROJECT LABOR GOALS

Project Goals:

1. The State of Minnesota has challenged this project to aggressively pursue compliance with the following Goals:

    1.1.1. 11% Targeted Group Businesses (TGB)
    1.1.2. 32% Minority Labor
    1.1.3. 6% Female Labor

2. The bidding subcontractor acknowledges the targeted group business and minority participation goals for the State Capitol and by submission of bid is committed to meet or exceed the stated goals for their work. Subcontractor shall participate in JE Dunn's internet based Job Connect program which costs $600 annually for the license agreement.

3. The Subcontractor shall designate a Women/Minority Work Force Inclusion Coordinator who will be responsible for recruiting, managing and reporting minority and women labor participation and all good faith efforts. Your Work Force Inclusion Officer will participate in fairs, events, programs and meetings as may be required by the project. Subcontractor shall develop and participate in comprehensive programs for recruiting, apprenticeship and training as may be required to meet project goals AND good faith efforts.

4. Each subcontractor that does not meet the contracting and labor goals noted above will be responsible to provide documentation of the good faith effort as defined by the MN Department of Humans Rights at http://mn.gov/mdhr/compliance/goodfaith.html. Failure to provide good faith documentation may result in rejection of a bid.

5. After award, each Subcontractor will be required to submit, with their pay application, monthly reporting and tracking sheets for the above described goals. If goals are not being met for the month, a detailed letter of explanation shall be included with the tracing reports. The letter shall include the plan of action to correct, and any good faith efforts associated.

JE DUNN CONSTRUCTION
9855 W. 78th Street, Suite 270
Eden Prairie, Minnesota 55344

P.O. Box 581549
Minneapolis, Minnesota 55458-1549

952-830-9000 Phone ⊠ 952-830-1365 Fax

TO: SUBCONTRACTORS

FROM: SHELLY PEARSON

RE: JE DUNN PROJECT #13063900 – MN STATE CAPITOL INTERIOR RENOVATIONS COMPLEX: EEO REPORTING

DATE: JUNE 19, 2013

EEO reporting is a requirement of the Minnesota State Capitol Interior Renovation project. The purpose of this memo is to outline the specific requirements and forms so that you may accurately report EEO on this project.

Please follow the below steps for your reporting:

1. Complete the attached Monthly Project Summary Report as well as the Monthly Utilization Report for each month that you have labor on site.
2. Submit the accurately completed forms to kathy.endres@jedunn.com no later than the 1st of every month.
3. This reporting should also include your Second Tier subs.
4. Please note that women are not counted as minority hours.

The following are attached documents that you will need for your reporting:

Monthly Project Summary Report

Monthly Utilization Report

If you have any questions, please feel free to call me at (952) 833-5963 or email me at shelly.pearson@jedunn.com .

Thank you for your cooperation.

Sincerely,

Shelly Pearson

Shelly Pearson

Project Coordinator

MONTHLY PROJECT SUMMARY REPORT

To be completed by the prime contractor for all hours (prime and subcontractor) worked on this project. For further instructions contact the Minnesota Department of Human Rights.

Company Name: _____

Current Month: _____ **Project Name and Location** **MN State Capitol Interior Renovations**

Project Number: _____ **Estimated Project Completion Date:** _____

Part I: **All Prime Contractors Please Complete This Section.**

		This Month	% of Total This Month	Project to Date	% of Total Project to Date
1(a)	Total Hours				
1(b)	Female Hours		%		%

PART II: **Please Complete This Section for Projects in the Twin Cities Area Only** (The Twin Cities includes Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties.)

		This Month	% of Total This Month	Project to Date	% of Total Project to Date
2(a)	Skilled Hours				
2(b)	Minority Skilled Hours		%		%
2(c)	Unskilled Hours				
2(d)	Minority Unskilled Hours		%		%

PART III: **Please Complete This Section for Projects Outside the Twin Cities Area** (All Counties in Minnesota EXCEPT Anoka, Carver, Dakota, Hennepin, Ramsey, Scott and Washington Counties.)

		This Month	% of Total This Month	Project to Date	% of Total Project to Date
3(a)	Total Hours				
3(b)	Minority Hours		%		%

EXHIBIT F

Minnesota Department of Human Rights Compliance Services Unit	Monthly Utilization Report	Reporting period: From: To:	Current Goals: Minority: 11% Females: 6%

This monthly utilization report is required by Minn. Statutes §363. Failure to report can result in cancellation, termination, or suspension of the contract, and the contractor may be declared ineligible for further state construction projects.

If you are the prime contractor, please return the completed report to:
Minnesota Department of Human Rights Compliance Services Section
Army Corps of Engineers Centre
190 E. 5th Street, Suite 700
St. Paul, MN 55101

If you are a sub contractor, send the completed form to the prime contractor.

Name and address of contracting firm:

Project #

Location **MN State Capitol Interior Renovations**

75 Rev. Dr. Martin Luther King Jr. Blvd.
St. Paul, MN

	Total Employees	Total Employees by Sex		Employees by Race and Sex										Total Minority Employees	Total Hours	Total Hours by Sex		Total Minority Hours
				Male Employees					Female Employees									
		M	F	B	H	AI/AN	A/PI	W	B	H	AI/AN	A/PI	W			M	F	
Supervisors																		
Foremen/women																		
Equipment Operators																		
Mechanics																		
Truck Drivers																		
Ironworkers																		
Carpenters																		
Cement Masons																		
Electricians																		
Pipefitters, Plumbers																		
Painters																		
Laborers																		
Totals																		

Prepared by:	Phone:	Date:

SECTION 00 73 43
PREVAILING WAGE REQUIREMENTS

Subcontractors and their sub-subcontractors shall pay their workmen not less than the prevailing hourly wage for workmen required to perform the Work of their Subcontract as established by the Division of Labor Standards, State of Minnesota, applicable to the location and Work to be performed on the Project. Subcontractors shall maintain payroll records substantiating compliance with the payment of the applicable prevailing wage including, but not limited to, certified payrolls and, if requested, provide copies to the Contractor or Owner of such records.

Prevailing wage reports must be submitted on the State's excel form in the excel format only.

STATEMENT OF COMPLIANCE
CONTRACTOR – SUBCONTRACTOR
MINNESOTA PREVAILING WAGE STATUTES

REPORT NUMBER	CONTRACT OR PURCHASE ORDER NUMBER		DATE
CONTRACTOR/SUBCONTRACTOR NAME		PHONE NUMBER	CONTRACT NUMBER
ADDRESS			PROJECT NUMBER
TYPE OF WORK			

(Complete as described on solicitation documents.)

STATEMENT WITH RESPECT TO COMPLIANCE AND WAGES PAID

I, _____, _____ do hereby state:
(Name of signatory party) (Title)

(1) That I pay or supervise the payment of the persons employed by _____ on said Contract; that during the payroll period commencing on the ___day of ___the year ____, and ending the ___day of ____the year ____, there were ____employees performing covered work on said Contract. That all persons performing work under said Contract are listed on the payroll and have been paid the full prevailing wages for all hours worked under said Contract, that no rebates and or deductions have or will be made either directly or indirectly to or on behalf of said _____
(Contractor or Subcontractor)
from the full wages earned by any person, other than permissible deductions as defined in as defined in Minnesota Statutes 177.24, Subdivision 4, 181.06, and 181.79, issued by the Minnesota Commissioner of Labor and Industry and described below.

DESCRIBE LEGAL DEDUCTIONS

_____

_____

_____

(2) That the payroll submitted under said Contract is complete and accurate; that the wage rate(s) of the laborer(s), mechanic(s), and worker(s) performing work under said Contract is (are) paid according to the wage determination(s) and labor provisions incorporated in said Contract and according to applicable laws; that wages paid to laborer(s), mechanic(s), and worker(s) performing work under said Contract is at least the prevailing wage rate for the most similar classification of labor performed as defined under applicable law; and that the laborer(s), mechanic(s), and worker(s) performing work under said Contract is (are) paid for all hours in excess of the prevailing hours at a rate of at least one and one-half times the applicable base rate of pay.

(3) That any apprentices employed during said payroll period are duly registered in a bona fide apprenticeship program registered with the Minnesota Department of Labor and Industry, or are registered with the Bureau of Apprenticeship and Training; United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO ANY APPROVED PLANS, FUNDS, OR PROGRAMS

☐ In addition to the basic hourly wage rates paid to each laborer, worker or mechanic listed on said payroll, payments to current, bona fide fringe benefit programs as set forth in paragraph 4(d), have been or will be made to the program's administrators as set forth in paragraph 4(e) for the benefit of said employees, except as noted in Section 4(c).

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH TO ALL EMPLOYEES

☐ Each laborer, worker, or mechanic listed on said payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic rate plus the fringe rate as listed in the appropriate wage determination incorporated into said Contract.

NOTE----FRINGE BENEFIT SECTIONS C, D, E AND SIGNATURE BLOCK IS ON REVERSE SIDE.

(c) EXCEPTIONS

EMPLOYEE NAME	CLASSIFICATION/OCCUPATION	EXPLANATION

(d) BENEFIT PROGRAM INFORMATION in DOLLARS CONTRIBUTED PER HOUR (Must be completed if 4(a) is checked.)

PROGRAM TITLE, CLASSIFICATION TITLE, OR INDIVIDUAL EMPLOYEES	HEALTH / WELFARE	VACATION / HOLIDAY	APPRENTICESHIP / TRAINING	PENSION	OTHER INCLUDE TITLE
	$	$	$	$	$
	$	$	$	$	$
	$	$	$	$	$
	$	$	$	$	$
	$	$	$	$	$
	$	$	$	$	$
	$	$	$	$	$
	$	$	$	$	$
	$	$	$	$	$
	$	$	$	$	$
	$	$	$	$	$

(e) BENEFIT PROGRAM INFORMATION (Must be completed if 4(a) is checked.)

NAME AND ADDRESS OF FRINGE BENEFIT FUND, PLAN, OR PROGRAM ADMINISTRATOR	BENEFIT ACCOUNT NUMBER	THIRD PARTY TRUSTEE AND/OR CONTACT PERSON	TELEPHONE NUMBER

The willful falsification of any of the above statements may subject the contractor or subcontractor to civil or criminal prosecution under state law. See Minnesota Statutes 16B, 16C, 177.30, 177.43, Subdivision 5, 177.44, Subdivision 6, 609.63.

NAME AND TITLE OF CONTRACTOR'S REPRESENTATIVE	SIGNATURE
As a representative of the contractor submitting the payroll identified above, I hereby certify that the payroll is true and correct to the best of my knowledge.	

NOTE: For questions regarding the Prevailing Wage Laws, contact the Department of Labor and Industry at 651.284.5091.

State of Minnesota Prevailing Wage Payroll Report - Submit to Contracting Agency and Project Manager

The Contractor and subcontractor(s) shall furnish this completed form via E-mail as an MS Excel attachment not more than 14 days after the end of each pay period. The e-mail address to send this form to was given in the solicitation or purchase order. The Subject Line of the E-mail must contain the Contracting Firm's Name and the Contract/Purchase Order Number. Copies of the Prevailing Wage Payroll Information Form and the Statement of Compliance Form are available on the MMD website at www.mmd.admin.state.mn.us/mn02000.htm.

All Payrolls must be certified by attaching to each report a completed and executed Statement of Compliance, Minnesota Prevailing Wage Statutes.

Name of Contractor or Subcontractor		Prime Contractor Name	
Address and Telephone #		Address & Telephone #	
State Project/Contract Number		Pay Period End Date		Project Location		Payroll #	

(1)	(2)	(3)	(4)	(5)Day of Week (M,T,W,R,F,S,Su) & Date (xx/xx)							(6)	(7)	(8)	(9)	(10) Deductions						(11)
Employee Name *Employee Identification Number (DO NOT provide Social Security No.)	# of Exemp tions	Labor Code and Classification Title	OT & ST	Hours Worked Each Day							Total Hours This Job	Hourly Rates of Pay	Gross Amount Earned This Job	Gross Amount Earned This Pay Period	FICA	Federal Tax	State Tax	Other (Specify) medicare	Other (Specify)	Total Deductions	Total Net Wages Paid
			OT																		
			ST																		
			OT																		
			ST																		
			OT																		
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***Pursuant to the Minnesota Government Data Practices Act, all of the data provided hereunder will be public data, which is available to anyone upon request. DO NOT provide any confidential data such as social security numbers or home addresses on this form. This data is collected pursuant to Minnesota Stat. § 177.30 Sub. 4 and 177.43 Sub. 3. If you have questions regarding the Prevailing Wage Laws, contact the Department of Labor and Industry at 651.284.5091. This form last revised 07/21/09.**

MINNESOTA DEPARTMENT OF LABOR AND INDUSTRY PREVAILING WAGES FOR STATE FUNDED CONSTRUCTION PROJECTS

THIS NOTICE MUST BE POSTED ON THE JOBSITE IN A CONSPICUOUS PLACE

Construction Type: Commercial

County Number: 62

County Name: RAMSEY

Effective: 2012-12-24 **R**evised: 2013-03-04

This project is covered by Minnesota prevailing wage statutes. Wage rates listed below are the minimum hourly rates to be paid on this project.

All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at a rate of one and one half (1 1/2) times the basic hourly rate.

Violations should be reported to:

Department of Labor and Industry
Prevailing Wage Section
443 Lafayette Road N
St Paul, MN 55155
(651) 284-5091
DLI.PrevWage@state.mn.us

* Indicates that adjacent county rates were used for the labor class listed.

County: RAMSEY (62)

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
LABORERS (101 - 112) (SPECIAL CRAFTS 701 - 730)				
101 LABORER, COMMON (GENERAL LABOR WORK)	2012-12-24	28.46	15.82	44.28
102 LABORER, SKILLED (ASSISTING SKILLED CRAFT JOURNEYMAN)	2012-12-24	28.46	15.82	44.28
103 LABORER, LANDSCAPING (GARDENER, SOD LAYER AND NURSERY OPERATOR)	2012-12-24	17.49	12.04	29.53
	2013-05-01	18.00	12.43	30.43
104 FLAG PERSON	2012-12-24	28.46	15.82	44.28
105* WATCH PERSON	2012-12-24	24.83	15.47	40.30
106* BLASTER	2012-12-24	29.46	15.82	45.28
107 PIPELAYER (WATER, SEWER AND GAS)	2012-12-24	28.82	15.72	44.54

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
	2013-05-01	28.77	16.02	44.79
108* TUNNEL MINER	2012-12-24	27.52	15.72	43.24
	2013-05-01	27.47	16.02	43.49
109 UNDERGROUND AND OPEN DITCH LABORER (EIGHT FEET BELOW STARTING GRADE LEVEL)	2012-12-24	27.52	15.72	43.24
	2013-05-01	27.47	16.02	43.49
110* SURVEY FIELD TECHNICIAN (OPERATE TOTAL STATION, GPS RECEIVER, LEVEL, ROD OR RANGE POLES, STEEL TAPE MEASUREMENT; MARK AND DRIVE STAKES; HAND OR POWER DIGGING FOR AND IDENTIFICATION OF MARKERS OR MONUMENTS; PERFORM AND CHECK CALCULATIONS; REVIEW AND UNDERSTAND CONSTRUCTION PLANS AND LAND SURVEY MATERIALS). THIS CLASSIFICATION DOES NOT APPLY TO THE WORK PERFORMED ON A PREVAILING WAGE PROJECT BY A LAND SURVEYOR WHO IS LICENSED PURSUANT TO MINNESOTA STATUTES, SECTIONS 326.02 TO 326.15.	2012-12-24	28.46	15.82	44.28
111* TRAFFIC CONTROL PERSON (TEMPORARY SIGNAGE)	2012-12-24	28.46	15.82	44.28
SPECIAL EQUIPMENT (201 - 204)				
201 ARTICULATED HAULER	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
202 BOOM TRUCK	2012-12-24	20.00	0.91	20.91
203* LANDSCAPING EQUIPMENT, INCLUDES HYDRO SEEDER OR MULCHER, SOD ROLLER, FARM TRACTOR WITH ATTACHMENT SPECIFICALLY SEEDING, SODDING, OR PLANT, AND TWO-FRAMED FORKLIFT (EXCLUDING FRONT, POSIT-TRACK, AND SKID STEER LOADERS), NO EARTHWORK OR GRADING FOR ELEVATIONS	2012-12-24	17.49	12.04	29.53
	2013-05-01	18.00	12.43	30.43
204 OFF-ROAD TRUCK	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US			
205* PAVEMENT MARKING OR MARKING REMOVAL EQUIPMENT (ONE OR TWO PERSON OPERATORS); SELF-PROPELLED TRUCK OR TRAILER MOUNTED UNITS.	2012-12-24	30.45	17.64	48.09
HIGHWAY/HEAVY POWER EQUIPMENT OPERATOR				
GROUP 2	2012-12-24	31.97	16.70	48.67
	2013-05-01	32.22	16.70	48.92
306 GRADER OR MOTOR PATROL				
308 TUGBOAT 100 H.P. AND OVER WHEN LICENSE REQUIRED (HIGHWAY AND HEAVY ONLY)				
GROUP 3 *	2012-12-24	20.57	5.39	25.96

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
309 ASPHALT BITUMINOUS STABILIZER PLANT				
310 CABLEWAY				
312 DERRICK (GUY OR STIFFLEG)(POWER)(SKIDS OR STATIONARY) (HIGHWAY AND HEAVY ONLY)				
314 DREDGE OR ENGINEERS, DREDGE (POWER) AND ENGINEER				
316 LOCOMOTIVE CRANE OPERATOR				
320 TANDEM SCRAPER				
322 TUGBOAT 100 H.P AND OVER (HIGHWAY AND HEAVY ONLY)				
GROUP 4 *	2012-12-24	31.12	16.70	47.82
	2013-05-01	31.37	16.70	48.07
323 AIR TRACK ROCK DRILL				
324 AUTOMATIC ROAD MACHINE (CMI OR SIMILAR) (HIGHWAY AND HEAVY ONLY)				
327 BITUMINOUS ROLLERS, RUBBER TIRED OR STEEL DRUMMED (EIGHT TONS AND OVER)				
328 BITUMINOUS SPREADER AND FINISHING MACHINES (POWER), INCLUDING PAVERS, MACRO SURFACING AND MICRO SURFACING, OR SIMILAR TYPES (OPERATOR AND SCREED PERSON)				
329 BROKK OR R.T.C. REMOTE CONTROL OR SIMILAR TYPE WITH ALL ATTACHMENTS				
330 CAT CHALLENGER TRACTORS OR SIMILAR TYPES PULLING ROCK WAGONS, BULLDOZERS AND SCRAPERS				
331 CHIP HARVESTER AND TREE CUTTER				
332 CONCRETE DISTRIBUTOR AND SPREADER FINISHING MACHINE, LONGITUDINAL FLOAT, JOINT MACHINE, AND SPRAY MACHINE				
334 CONCRETE MOBIL (HIGHWAY AND HEAVY ONLY)				
335 CRUSHING PLANT (GRAVEL AND STONE) OR GRAVEL WASHING, CRUSHING AND SCREENING PLANT				
336 CURB MACHINE				
337 DIRECTIONAL BORING MACHINE				
338 DOPE MACHINE (PIPELINE)				
340 DUAL TRACTOR				
341 ELEVATING GRADER				
345 GPS REMOTE OPERATING OF EQUIPMENT				
347 HYDRAULIC TREE PLANTER				
348 LAUNCHER PERSON (TANKER PERSON OR PILOT LICENSE)				
349 LOCOMOTIVE (HIGHWAY AND HEAVY ONLY)				
350 MILLING, GRINDING, PLANNING, FINE GRADE, OR TRIMMER MACHINE				
352 PAVEMENT BREAKER OR TAMPING MACHINE (POWER DRIVEN) MIGHTY MITE OR SIMILAR TYPE				
354 PIPELINE WRAPPING, CLEANING OR BENDING MACHINE				
356 POWER ACTUATED HORIZONTAL BORING MACHINE, OVER SIX INCHES				
357 PUGMILL				
359 RUBBER-TIRED FARM TRACTOR WITH BACKHOE INCLUDING ATTACHMENTS (HIGHWAY AND HEAVY ONLY)				
360 SCRAPER				
361 SELF-PROPELLED SOIL STABILIZER				
362 SLIP FORM (POWER DRIVEN) (PAVING)				
363 TIE TAMPER AND BALLAST MACHINE				
367 TUB GRINDER, MORBARK, OR SIMILAR TYPE				
GROUP 5	2012-12-24	13.50	2.39	15.89
370 BITUMINOUS ROLLER (UNDER EIGHT TONS)				
371 CONCRETE SAW (MULTIPLE BLADE) (POWER OPERATED)				
372 FORM TRENCH DIGGER (POWER)				
375 HYDRAULIC LOG SPLITTER				
376 LOADER (BARBER GREENE OR SIMILAR TYPE)				

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
377 POST HOLE DRIVING MACHINE/POST HOLE AUGER				
379 POWER ACTUATED JACK				
381 SELF-PROPELLED CHIP SPREADER (FLAHERTY OR SIMILAR)				
382 SHEEP FOOT COMPACTOR WITH BLADE . 200 H.P. AND OVER				
383 SHOULDERING MACHINE (POWER) APSCO OR SIMILAR TYPE INCLUDING SELF-PROPELLED SAND AND CHIP SPREADER				
384 STUMP CHIPPER AND TREE CHIPPER				
385 TREE FARMER (MACHINE)				
GROUP 6 *	2012-12-24	26.87	16.70	43.57
	2013-05-01	27.12	16.70	43.82
387 CAT, CHALLENGER, OR SIMILAR TYPE OF TRACTORS, WHEN PULLING DISK OR ROLLER				
389 DREDGE DECK HAND				
391 GRAVEL SCREENING PLANT (PORTABLE NOT CRUSHING OR WASHING)				
393 LEVER PERSON				
395 POWER SWEEPER				
396 SHEEP FOOT ROLLER AND ROLLERS ON GRAVEL COMPACTION, INCLUDING VIBRATING ROLLERS				
COMMERCIAL POWER EQUIPMENT OPERATOR				
GROUP 1 *	2012-12-24	35.19	15.95	51.14
501 HELICOPTER PILOT (COMMERCIAL CONSTRUCTION ONLY)				
502 TOWER CRANE 250 FEET AND OVER (COMMERCIAL CONSTRUCTION ONLY)				
503 TRUCK CRAWLER CRANE WITH 200 FEET OF BOOM AND OVER, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 2 *	2012-12-24	34.85	15.95	50.80
504 CONCRETE PUMP WITH 50 METERS/164 FEET OF BOOM AND OVER (COMMERCIAL CONSTRUCTION ONLY)				
505 PILE DRIVING WHEN THREE DRUMS IN USE (COMMERCIAL CONSTRUCTION ONLY)				
506 TOWER CRANE 200 FEET AND OVER (COMMERCIAL CONSTRUCTION ONLY)				
507 TRUCK OR CRAWLER CRANE WITH 150 FEET OF BOOM UP TO AND NOT INCLUDING 200 FEET, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 3	2012-12-24	33.44	15.95	49.39
508 ALL-TERRAIN VEHICLE CRANES (COMMERCIAL CONSTRUCTION ONLY)				
509 CONCRETE PUMP 32-49 METERS/102-164 FEET (COMMERCIAL CONSTRUCTION ONLY)				
510 DERRICK (GUY & STIFFLEG) (COMMERCIAL CONSTRUCTION ONLY)				
511 STATIONARY TOWER CRANE 200 FEET AND OVER MEASURED FROM BOOM FOOT PIN (COMMERCIAL CONSTRUCTION ONLY)				
512 SELF-ERECTING TOWER CRANE 100 FEET AND OVER MEASURED FROM BOOM FOOT PIN (COMMERCIAL CONSTRUCTION ONLY)				
513 TRAVELING TOWER CRANE (COMMERCIAL CONSTRUCTION ONLY)				
514 TRUCK OR CRAWLER CRANE UP TO AND NOT INCLUDING 150 FEET OF BOOM, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 4 *	2012-12-24	33.10	15.95	49.05
515 CRAWLER BACKHOE INCLUDING ATTACHMENTS (COMMERCIAL CONSTRUCTION ONLY)				
516 FIREPERSON, CHIEF BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)				
517 HOIST ENGINEER (THREE DRUMS OR MORE) (COMMERCIAL CONSTRUCTION ONLY)				
518 LOCOMOTIVE (COMMERCIAL CONSTRUCTION ONLY)				
519 OVERHEAD CRANE (INSIDE BUILDING PERIMETER) (COMMERCIAL CONSTRUCTION ONLY)				

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
520 TRACTOR . BOOM TYPE (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 5	2012-12-24	32.93	15.95	48.88
521 AIR COMPRESSOR 450 CFM OR OVER (TWO OR MORE MACHINES) (COMMERCIAL CONSTRUCTION ONLY)				
522 CONCRETE MIXER (COMMERCIAL CONSTRUCTION ONLY)				
523 CONCRETE PUMP UP TO 31 METERS/101 FEET OF BOOM				
524 DRILL RIGS, HEAVY ROTARY OR CHURN OR CABLE DRILL WHEN USED FOR CAISSON FOR ELEVATOR OR BUILDING CONSTRUCTION (COMMERCIAL CONSTRUCTION ONLY)				
525 FORKLIFT (COMMERCIAL CONSTRUCTION ONLY)				
526 FRONT END, SKID STEER 1 C YD AND OVER				
527 HOIST ENGINEER (ONE OR TWO DRUMS) (COMMERCIAL CONSTRUCTION ONLY)				
528 MECHANIC-WELDER (ON POWER EQUIPMENT) (COMMERCIAL CONSTRUCTION ONLY)				
529 POWER PLANT (100 KW AND OVER OR MULTIPLES EQUAL TO 100KW AND OVER) (COMMERCIAL CONSTRUCTION ONLY)				
530 PUMP OPERATOR AND/OR CONVEYOR (TWO OR MORE MACHINES) (COMMERCIAL CONSTRUCTION ONLY)				
531 SELF-ERECTING TOWER CRANE UNDER 100 FEET MEASURED FROM BOOM FOOT PIN (COMMERCIAL CONSTRUCTION ONLY)				
532 STRADDLE CARRIER (COMMERCIAL CONSTRUCTION ONLY)				
533 TRACTOR OVER D2 (COMMERCIAL CONSTRUCTION ONLY)				
534 WELL POINT PUMP (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 6 *	2012-12-24	31.42	15.95	47.37
535 CONCRETE BATCH PLANT (COMMERCIAL CONSTRUCTION ONLY)				
536 FIREPERSON, FIRST CLASS BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)				
537 FRONT END, SKID STEER UP TO 1 C YD				
538 GUNITE MACHINE (COMMERCIAL CONSTRUCTION ONLY)				
539 TRACTOR OPERATOR D2 OR SIMILAR SIZE (COMMERCIAL CONSTRUCTION ONLY)				
540 TRENCHING MACHINE (SEWER, WATER, GAS) EXCLUDES WALK BEHIND TRENCHER				
GROUP 7 *	2012-12-24	30.30	15.95	46.25
541 AIR COMPRESSOR 600 CFM OR OVER (COMMERCIAL CONSTRUCTION ONLY)				
542 BRAKEPERSON (COMMERCIAL CONSTRUCTION ONLY)				
543 CONCRETE PUMP/PUMPCRETE OR COMPLACO TYPE (COMMERCIAL CONSTRUCTION ONLY)				
544 FIREPERSON, TEMPORARY HEAT SECOND CLASS BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)				
545 OILER (POWER SHOVEL, CRANE, TRUCK CRANE, DRAGLINE, CRUSHERS AND MILLING MACHINES, OR OTHER SIMILAR POWER EQUIPMENT) (COMMERCIAL CONSTRUCTION ONLY)				
546 PICK UP SWEEPER (ONE CUBIC YARD HOPPER CAPACITY) (COMMERCIAL CONSTRUCTION ONLY)				
547 PUMP AND/OR CONVEYOR (COMMERCIAL CONSTRUCTION ONLY)				
GROUP 8 *	2012-12-24	28.29	15.95	44.24
548 ELEVATOR OPERATOR (COMMERCIAL CONSTRUCTION ONLY)				
549 GREASER (COMMERCIAL CONSTRUCTION ONLY)				
550 MECHANICAL SPACE HEATER (TEMPORARY HEAT NO BOILER LICENSE REQUIRED) (COMMERCIAL CONSTRUCTION ONLY)				
TRUCK DRIVERS				
GROUP 1 *	2012-12-24	25.50	1.84	27.34
601 MECHANIC . WELDER				
602 TRACTOR TRAILER DRIVER				
603 TRUCK DRIVER (HAULING MACHINERY INCLUDING OPERATION OF HAND AND POWER OPERATED WINCHES)				

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
GROUP 2 *	2012-12-24	22.00	5.85	27.85
604 FOUR OR MORE AXLE UNIT, STRAIGHT BODY TRUCK				
GROUP 3 *	2012-12-24	25.00	0.00	25.00
605 BITUMINOUS DISTRIBUTOR DRIVER				
606 BITUMINOUS DISTRIBUTOR (ONE PERSON OPERATION)				
607 THREE AXLE UNITS				
GROUP 4	2012-12-24	35.82	8.18	44.00
608 BITUMINOUS DISTRIBUTOR SPRAY OPERATOR (REAR AND OILER)				
609 DUMP PERSON				
610 GREASER				
611 PILOT CAR DRIVER				
612 RUBBER-TIRED, SELF-PROPELLED PACKER UNDER 8 TONS				
613 TWO AXLE UNIT				
614 SLURRY OPERATOR				
615 TANK TRUCK HELPER (GAS, OIL, ROAD OIL, AND WATER)				
616 TRACTOR OPERATOR, UNDER 50 H.P.				
SPECIAL CRAFTS				
701 HEATING AND FROST INSULATORS	2012-12-24	41.17	18.59	59.76
	2013-06-01	41.67	18.59	60.26
702 BOILERMAKERS	2012-12-24	31.87	24.40	56.27
	2013-01-01	33.52	24.40	57.92
703 BRICKLAYERS	2012-12-24	32.20	17.96	50.16
704 CARPENTERS	2012-12-24	31.69	17.45	49.14
705 CARPET LAYERS (LINOLEUM)	2012-12-24	33.27	14.15	47.42
706 CEMENT MASONS	2012-12-24	32.39	16.60	48.99
707 ELECTRICIANS	2012-12-24	35.79	23.92	59.71
	2013-05-01	37.19	23.92	61.11
708 ELEVATOR CONSTRUCTORS	2012-12-24	43.21	28.33	71.54
	2013-01-01	43.21	29.98	73.19
709 GLAZIERS	2012-12-24	35.69	14.55	50.24
710* LATHERS	2012-12-24	31.89	17.27	49.16
712 IRONWORKERS	2012-12-24	34.15	21.20	55.35
714 MILLWRIGHT	2012-12-24	30.18	20.24	50.42

	LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
715	PAINTERS (INCLUDING HAND BRUSHED, HAND SPRAYED, AND THE TAPING OF PAVEMENT MARKINGS)	2012-12-24	31.45	17.95	49.40
716	PILEDRIVER (INCLUDING VIBRATORY DRIVER OR EXTRACTOR FOR PILING AND SHEETING OPERATIONS)	2012-12-24	32.29	17.78	50.07
		2013-05-01	32.79	17.78	50.57
717	PIPEFITTERS . STEAMFITTERS	2012-12-24	39.70	22.99	62.69
718	PLASTERERS	2012-12-24	34.40	14.62	49.02
719	PLUMBERS	2012-12-24	37.29	23.41	60.70
720	ROOFER	2012-12-24	34.12	14.91	49.03
721	SHEET METAL WORKERS	2012-12-24	39.37	20.56	59.93
		2013-06-01	40.29	20.21	60.50
722	SPRINKLER FITTERS	2012-12-24	39.74	20.79	60.53
723*	TERRAZZO WORKERS	2012-12-24	31.58	17.53	49.11
724	TILE SETTERS	2012-12-24	27.91	18.63	46.54
725	TILE FINISHERS	2012-12-24	22.87	14.98	37.85
726	DRYWALL TAPER	2012-12-24	30.17	19.12	49.29
727	WIRING SYSTEM TECHNICIAN	2012-12-24	33.12	11.98	45.10
728	WIRING SYSTEMS INSTALLER	2012-12-24	23.17	10.02	33.19
729	ASBESTOS ABATEMENT WORKER	2012-12-24	27.33	14.94	42.27
		2013-01-01	27.53	15.34	42.87
730	SIGN ERECTOR	2012-12-24	25.39	10.78	36.17

SECTION 000120
PROJECT DIRECTORY

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END OF DOCUMENT

SECTION 011100
SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Description of construction delivered under a single contract.
   2. Restrictions that affect construction operations.
   3. Use of buildings, premises and site.

1.2 GENERAL SUMMARY OF WORK AND ADDITIONAL DEFINITIONS

A. Owner: State of Minnesota

B. Project Location: State Capitol Building, St. Paul, Minnesota

C. General Scope: Project consists of terrace level demolition of the floor slab and non-structural partitions as well as terrace level infrastructure demolition including mechanical, electrical, plumbing, telecommunication, and fire protection as described within the WP-1 Contract Documents. Protection of the systems serving all tenant occupied spaces at the terrace level, and all of the other levels of the building is required. The work within the building will also include temporary feeding and temporary relocation of engineering systems to allow for the demolition of walls and slabs at the terrace level. Phasing of the demolition efforts and temporary feeding of building systems to maintain functionality of building systems will be coordinated by the Construction Manager. Also included is the construction of temporary parking lots on the Capitol Mall as described within the scope of the Contract Documents. The lots shall be completed and available for use by September 1, 2013.
   1. Work Included: Provide labor, materials, articles, equipment, incidentals, items, tools, services, supplies, methods, operations, skills in such quantities as may be necessary to complete Project within intent of Contract Documents.
   2. Singular notations shall be considered plural where plural application is reasonably inferable. Mention or indication of extent of work under work division or specification section is done only for convenience of Contractor and shall not be construed as describing all work required under that Division or Section.

D. Construction Contract: Construction will be accomplished under a single Prime Contract including General Construction, Mechanical and Electrical work.

E. Construction Limits: Except as specifically indicated or as may be necessary to complete the Work under the Contract, activities of the Contract shall be limited to within the limits designated on Drawings.

1.3 SUBCONTRACTORS

A. Do not award work to Subcontractor without prior approval of Owner and Architect. Approval will not be given until Contractor submits List of Subcontractors containing such information as Owner and Architect may require concerning the proposed Subcontractor and scope of subcontract. (Refer to Section 013300 - Submittals).

1.4 USE BY OWNER

A. Owner reserves the right to let other contracts in connection with this Project or in connection with existing buildings. This Contractor must afford other contractors reasonable opportunity for the introduction and storage of their materials and execution of their work, and shall properly connect and coordinate the contractor's work with theirs.

B. Owner reserves the right to jointly occupy the premises with Contractor in performance of Owner's duties and functions. Owner also reserves the right to: enter into the Project and premises; make installations of materials and equipment at appropriate times as the Work progresses; install equipment, furniture and furnishings when spaces are at appropriate stages of completion. Coordinate work with Owner and cooperate with Owner to minimize undue interferences.

C. If any part, unit, phase, or the entire Project is substantially complete or ready for occupancy, Owner may, upon notice to Contractor, and without prejudice to rights of Owner or Contractors, enter into and make use of work that is substantially complete.

1.5 MAINTAINING SERVICES AND FUNCTIONS

A. General: It is essential that full Owner's services and functions are maintained throughout construction period, with minimum disturbance and disruption to Owner's operations. Contractor and Subcontractors shall be aware of these requirements and objectives. Contractor must conduct work and develop a detailed schedule to meet these requirements and objectives.

B. Work at Occupied Facilities: After Owner's occupancy (full or partial) of Project or unit, stage, phase or area, work remaining to be accomplished in the occupied spaces shall be done in cooperation with, and approval by, Owner and scheduled in advance with Owner. In general, work in occupied spaces shall be done when the space is not in use, such as after hours in administrative areas or public spaces when public use hours are over for the day, unless specifically approved by Owner. Where necessary, overtime shall be used if work cannot reasonably be accomplished during normal work periods, at no extra cost to Owner. Perform work in occupied areas in a manner and at such time as will not significantly interfere with, hamper or inconvenience Owner's program or functions.

1.6 PERFORMANCE/PAYMENT BOND

A. Owner reserves the right to require a bond in accordance with General Conditions and Supplementary Conditions. Provide on form specified.

1. AIA A311.
2. (Miller/Davis Bond Form) (public work only)
3. Provide and pay for bond.

1.7 OTHER BONDS, PERMITS, FEES

A. Provide and pay for bonds, fees and permits that may be required, including bonds, permits and fees required by municipalities, including connecting fees, to directly accomplish work under this project.

B. Request proper authorities to apply for permits and fees for sewer availability charge (SAC) and water availability charge (WAC). Owner will pay sewer and water availability charges.

1.8 WARRANTIES

A. In the event of conflict, inconsistency, or difference between a warranty issued by a supplier or contractor and terms of specifications, Owner, if it becomes necessary to enforce terms and provisions of warranty or specifications, may elect to enforce either submitted warranty or specifications.

1.9 ELECTRONIC FILES

A. Upon request, one copy of electronic files in Architect's current file format, including applicable layers, for each issue (bid packages, construction packages, addenda, etc.) will be provided via e-mail, CD, or website posting at Architect's option to General Contractor at no charge for:

1. Architectural floor plans
2. Reflected ceiling plans
3. Structural framing plans
4. HVAC plans
5. Plumbing plans
6. Lighting plans

7. Signal/System plans
8. Power plans.

B. Additional documents not listed or additional copies of electronic files are available upon request with advance payment of applicable fee(s) and subject to conditions of use. Contact Architect for schedules of fees and additional details about conditions. Subcontractors and others can obtain copies of electronic files from General Contractor.

C. Electronic files and information therein are instruments of service and works in progress created for this Project and not to be used for other projects, additions to this project or completion of this Project by others.

D. Signed and sealed original hard copy Drawings, Specifications and other documents as defined by General Conditions are Contract Documents. Electronic files are not Contract Documents and may be subject to manipulation beyond Architect's control. Therefore, Architect cannot verify that electronic files accurately or completely reflect Contract Documents, actual construction or field conditions. Each user of electronic files must determine accuracy, completeness and suitability for its intended use.

E. Electronic files are subject to discrepancies as a result of numerous factors including but not limited to transmission and translation errors resulting from differences in software, hardware and other equipment related problems, disc or server malfunctions, data corruption during transmission through website or email and user error. Neither Architect nor Owner shall be responsible for such discrepancies.

F. Architect makes no representation regarding accuracy, completeness or permanence of electronic files. Changes to Contract Documents may not be incorporated into electronic files including without limitation, Addenda information or revisions made after date indicated on electronic files.

G. By accepting electronic files, user covenants not to sue, and agrees to indemnify and hold harmless Architect and Owner from costs (including attorneys' fees), claims or causes of action be it tort, breach of contract or otherwise that result from the use of electronic files, and waives claims for consequential and/or liquidated damages against Architect and Owner.

H. Architect and Owner provide no warranties, express or implied with respect to electronic files, including but not limited to, Spearin type warranties, warranties of merchantability and/or fitness for a particular purpose.

I. Use of electronic files provided by Architect does not obviate Contractor, subcontractor/installer or supplier from responsibility for proper checking and coordination of dimensions, details, member sizes, quantities and other requirements to facilitate complete and accurate fabrication, installation and completion of Work.

J. Providing electronic files by Architect is not to be construed to be in derogation of reserved or intellectual property rights.

1.10 COPIES OF DRAWINGS AND SPECIFICATIONS

A. Drawings and Specifications will be made available to Contractor via an electronic distribution service. Subcontractors obtain documents from Contractor. Subcontractors are responsible for costs associated with hard copy printing drawings from this service. Provide one set for the on-site set to record changes as Record Set.

1.11 USE OF PREMISES - SPECIAL CONSIDERATIONS, REQUIREMENTS AND CONSTRAINTS

A. Refer to Section 007300 (By CM).

1.12 USE OF PREMISES - BROKEN GLASS

A. Contractor is responsible for glass of the new building and glass in existing adjacent buildings in the vicinity of this Project. Provide protection for glass, except Subcontractors shall protect their own glass.

B. Near completion of Project, Contractor must replace broken, cracked, scratched or otherwise damaged or faulty glass, without additional reimbursement. Replace glass damaged by welding splatter. Cost of replacing glass broken or damaged by Subcontractors shall be paid for by party causing damage.

1.13 USE OF PREMISES - CLEAN CONDITIONS

A. References: Refer to General Conditions for general cleaning requirements, Section 017700 for Project Closeout Clean-up and Section 007300 for additional temporary closure requirements.

B. General: Contractor and subcontractors shall maintain clean conditions in areas of existing buildings and where new construction interfaces with existing buildings. Maintain areas free of accumulations of combustible materials. Provide good housekeeping and regular cleaning to maintain areas clean and free of debris. Provide proper closures between areas under construction including closures and measures to prevent spread of dust or other contamination.

1.14 HAZARDOUS SUBSTANCES AND HARMFUL PHYSICAL AGENTS

A. Where work of this project involves possible hazardous substances or harmful physical agents, exercise extreme care to avoid damage and preserve safety of personnel.

B. Regulations concerning availability of information and employee training in use and handling of "hazardous substances" and "harmful physical agents" are governed by Employee Right-to-Know Act of (1983 unless otherwise revised or updated; or amended by local jurisdictions).

C. Regulations governing handling of asbestos-containing materials and disposal of asbestos-containing debris are:

1. Code of Federal Regulations, Title 29, U.S. Department of Labor - Occupational Safety and Health Administration (OSHA), Section 1910.1001 - Asbestos.
2. Local pollution control agency Rules for Emission Standards for Asbestos.

1.15 GENERAL PROTECTION AND SAFETY

A. References: Refer to General Conditions of the Contract for general requirements.

B. General: In accordance with best construction practices, Contractor is solely and completely responsible for conditions of job site, including safety of persons and property affected directly or indirectly by contractor’s operations during performance of Work. This requirement shall apply continuously 24 hours per day until acceptance of Work by Owner and shall not be limited to normal working hours.

1.16 SAFETY DIRECTOR - FIRE AND ACCIDENT

A. Safety Director: Appoint a responsible employee to act as Safety Director (fire and accident or separate individuals for each) whose duty it shall be to prevent accidents and minimize fire hazards and to enforce safety precautions. Safety Director shall develop procedures and regulations to guide Contractor, subcontractors and workers. With particular respect to existing buildings, facilities, and Owner's staff, Safety Director shall consult with and be guided by directions of Owner.

B. Compliance: Contractor and Subcontractors shall conform to and abide by requirements of Safety Director.

C. Inspection: Safety Director shall periodically inspect spaces of work under this Contract and operations of Contractor and list hazards to be removed or corrected. These shall be reported to Owner, Contractor and responsible subcontractors, who shall promptly remove or correct hazards.

D. Site Meetings: Safety Director shall hold accident and fire prevention meetings at least once a month with representatives of various trades employed to insure employees understand and comply with programs.

1.17 FIRE SAFETY PRECAUTIONS

A. Reference: Refer to General Conditions for general requirements.

B. General: Contractor and Safety Director shall recognize the utmost importance of extraordinary precautions to prevent a fire in or adjacent to functioning and occupied building. Contractor, subcontractors and workers shall exercise extreme care to maintain and exercise fire safety precautions through work. This shall include providing sufficient fire fighting devices, watchmen, standby helpers or other precautions during construction, in use of temporary heat, welding, bracing, sweating, testing or other phases of work. Refer to Section 015200 for temporary fire fighting devices to be provided under Contract.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 012200
UNIT PRICES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Unit Prices.

B. Related Sections:
   1. Section 310000 – Earthwork

1.2 QUALITY ASSURANCE

A. Acceptance or Rejection: Owner reserves right to accept Unit Prices or reject those of Bidder where cost proposal is inconsistent with reasonable evaluation of work involved and project conditions.

B. Owner may consider Bids of other bidders in evaluating Unit Prices.
   1. Sole right to accept or reject Unit Prices is vested in Owner and that decision shall be final.

1.3 RELATED COSTS AND CONSIDERATIONS

A. Each Unit Price shall include:
   1. Cost of labor, materials, equipment, supervision, bond, taxes, insurance, transportation and demurrage, storage, overhead, profit and other related costs.

B. No increase in Unit Prices or additional costs will be allowed for other consideration, such as:
   1. Change in schedule,
   2. Change in labor costs,
   3. Delay,
   4. Efficiency loss
   5. Or other related matters when Contract Sum is adjusted by application of Unit Prices for work performed or not performed.

C. Base prices upon specified materials and methods.

PART 2 UNIT PRICES

2.1 LIST OF UNIT PRICES

A. Unit Price No. 1 Unsuitable Material
   1. Remove Unsuitable Material (off-site disposal): Provide a price per cubic yard (in place) for removal of unsuitable material and properly disposing of the material off-site as indicated in Section 310000.

B. Unit Price No. 2 Select Granular Material (borrow)
   1. Provide a price per cubic yard (in place) for importing and placing "Select Granular Material" in accordance with the specified requirements for Primary Fill to replace Unsuitable Material as indicated in Section 310000.

C. Unit Price No. 3 Stabilization Geotextile
   1. Provide a unit price per square yard (installed) to furnish and place a stabilization geotextile on sub-grade as indicated in Section 310000.

D. Unit Price No. 4 Stabilization Aggregate
   1. Provide a price per cubic yard (in place) for importing and placing "Stabilization Aggregate" in accordance with the specified requirements for "primary fill." as indicated in Section 310000.

E. Unit Price No. 5 Boulders

1. Base bid includes removing from the site boulders up to 1 cubic yard. Provide a unit price per cubic yard for removing boulders larger than 1 cubic yard and properly disposing off-site as indicated in Section 310000.

END OF SECTION

SECTION 013300
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Procedures for submittals.

B. Related Sections:
   1. General Conditions: General Requirements.
   2. Section 011100 - Summary of Work.
   3. Section 017700 - Closeout Procedures.
   4. Section 017800 - Closeout Submittals.
   5. Section 013310 – Submittal Transmittal.

1.2 SUBMITTAL SCHEDULE

A. Prepare and submit "Submittal Schedule" within 10 days after award of Contract, and prior to execution of Contract. Include following information.
   1. Specification Section Number.
   2. Type of submittal required.
   3. Estimated time for submittal.

B. Coordinate, organize and plan submittal schedule so submittals are sent with appropriate time allowed for review (minimum 10 working days) and so submittals do not accumulate into unreasonably large groups.

C. Some submittals may require additional time for routing and review including, but not limited to, following:
   1. Unreasonably large groups of submittals.
   2. Curtainwalls.
   3. Submittals that need to be routed to multiple disciplines and consultants.

1.3 TRANSMITTAL FORM

A. Send submittals with "Submittal Transmittal Form" Section 013310 completely filled out with appropriate information.

B. Submittals sent without properly completed "Submittal Transmittal Form" will be considered incomplete and marked "Not Accepted" and returned without review.

C. Send separate transmittal forms for each Section and separate transmittals for each type listed:
   1. Shop Drawings.
   2. Product Data.
   3. Samples.

D. If shop drawings, samples or product data describe the same product or item, send submittals together under same transmittal otherwise send each type submittal under separate transmittals.

1.4 SUBMITTAL ACCEPTANCE

A. Refer to General Conditions for scope of submittal review and acceptance.

B. Substitutions or Contract modifications shall not be made in submittals. Exceptions and variations must be clearly noted on submittal and accompanied by the appropriate supporting forms. Follow documented procedures for substitutions or Contract modifications and send with submittal if a change is being proposed. Approval of a submittal with substitutions or modifications included but that have not been specifically and individually approved does not constitute acceptance of the substitution and Contractor will be responsible for exception or variations not in compliance with Contract Documents.

C. For submittals need to be resubmitted after the first review, Contractor will be responsible for Architects fees for more than the second review unless otherwise agreed.

D. Maintain copies of "Approved" and "Conditionally Approved" submittals with record set per 017800.

E. "Approved" submittals have no exceptions noted. One set of accepted submittals will be returned to Contractor. Make appropriate copies for use and distribution.

F. "Conditionally Approved" submittals have exceptions noted but resubmission is not required. Make appropriate copies for use and distribution.

G. "Not Approved" submittals are incomplete and/or need corrections. Complete and/or correct and resubmit until final acceptance is obtained.

H. "Received" means submittals are for information only and have not been reviewed.

I. "Not Reviewed" means submittals were not required and have not been reviewed or were provided for information only.

1.5 CONTRACTOR'S PLAN OF OPERATION

A. Submit at Pre-Construction Conference. Refer to Section 013100.

B. Outline in writing approach to meeting schedule for completing Work.

C. Plan to include, but not limited to, following:

1. Sequence of Work.
2. Construction Schedule.
3. Schedule of Submittals.
4. Schedule of Temporary Utilities.
5. Staging requirements/street permits.
6. Normal work hours.
7. Parking exceptions
8. Material delivery coordination.
9. Name of person to be liaison to adjacent property Owners.
10. Name of duly authorized representative with whom business may be conducted in connection with administration of Contract.
11. Name of duly authorized superintendent written notices may be given in accordance with Conditions of the Contract.
12. Labor and equipment availability
13. List of Subcontractors
14. Names of contact persons with Owner, Architect and Contractor
15. Proposed schedule of Progress Meetings in accordance with Section 013100 and schedule of submittals per Section 013310 and payment requests per Section 012900, and other reports required by Contract Documents.

1.6 COORDINATION

A. Send submittals in logical groups of related items including but not limited to the following groups:

1. Submittal schedule, list of materials, list of subcontractors, schedule of values
2. Doors, frames and hardware.
3. Glass and curtain wall system.
4. Closeout submittals: Refer to Section 017800.

1.7 DISTRIBUTION

A. Contractor is responsible for duplication and distribution of accepted submittals including shop drawings. Exchange directly with subcontractors and others involved, not through Owner or Architect.

B. Provide and exchange submittals as needed to coordinate Work.

C. Provide copies to Owner if Owner requests copies during construction. Otherwise Owner will receive accepted submittals as part of Record Set submitted during project closeout.

1.8 ELECTRONIC SUBMITTALS

A. Electronic submittals is the preferred method of review. Follow these procedures:
   1. Provide one pdf file for each submittal to Submittals Coordinator. PDF file must be unlocked, editable and printable to accommodate electronic mark-ups or printing a hard copy from mark-up.
   2. Electronic submittals are to be complete and self contained with each item requiring Architect's action.
      a. Web links or other electronic submittals requiring Architect to surf websites or navigate to find documents on websites or posting services are not acceptable.
      b. If construction phase file hosting services or programs are used such as Prolog, Primavera or documents hosting programs may be considered subject to coordination with Architect.
      c. Such procedures should not require Architect to search for submittals but should follow procedures that are the electronic equivalent of hard copy submittals sent by Contractor to Architect in a manner acceptable to Architect.
   3. Where project data is intended to show colors, provide original hard copy only. See Product Data herein. No electronic submittals for color submittals.
   4. Submit samples according to Samples article herein. No electronic submittals for samples will be permitted.
   5. Architect will return one marked up electronic submittal for Contractor to process and distribute to subcontractors and for Owner according to Distribution article requirements herein.
   6. On each electronic submittal, provide Contractor review and approval stamp on each submittals.

1.9 SHOP DRAWINGS

A. Use of Architect's Drawings: Do not reproduce Architect's drawings (whether CADD files, electronic files, hard copy drawings or other publication method) to serve as shop drawings until Architect's written permission is received and then only under the following conditions.
   1. Use is subject to terms and conditions included in written permission.
   2. Use only where necessary to indicate general location of a specific fabricated item.
   3. Remove extraneous notes and information from Drawing before inclusion in submittal. Only show information related to fabrication, erection, installation, application of components, products or systems being produced. Do not include Architect's title block or other information identifying Architect.
   4. Submitted drawing should only include information intended to be reviewed and accepted.
   5. Refer to Summary of Work for additional information on Electronic files.

B. Drawings that include unnecessary information will be marked "Not Reviewed" or "Not Approved" and returned.

C. Shop drawings submitted without requested information and without Contractor's approval will not be reviewed and will be returned to Contractor marked "Not Approved."

D. Drawings Submittal Requirements:
   1. Submit 1 opaque copies of each drawing.
      a. Architect will retain a copy.
   2. Provide additional copies for other contractors for purposes of information and coordination.
   3. Number in submittal sequence.
   4. Include contractor's stamp of approval, as evidence that drawings are approved in accordance with General Conditions except that field dimensions must be verified prior to approval and submittal.
   5. Show field verified dimensions on final shop drawings and identify verified dimensions.
   6. Show actual adjacent construction and how each item coordinates with other subcontractors, trades and suppliers.
   7. Drawings must be clear, sharp and readable quality acceptable to Architect/Engineer.
   8. Provide clear space on each drawing of not less than 40 square inches for Architect's stamp.
   9. Transmit in mailing tubes.

E. Maintain accepted shop drawings as part of "Record Set." See 017800.

1.10 PRODUCT DATA AND EQUIPMENT BROCHURES

A. Provide multiple originals of brochures, cuts, etc., if they are multi-page bound catalogs which would be difficult to photocopy or if they are intended to illustrate color or other appearance characteristics which cannot be adequately represented by photocopies.

B. Photocopies of original brochures are acceptable except as specified above. Photo copies must be clear and readable. Unreadable or unclear photocopies will be returned "Not Accepted."

C. Provide layout drawings where necessary for field use or as required by Architect.

D. Number of Copies of Product Data:
   1. Submit 1 minimum unless otherwise specified. Submit multiple copies of color brochures and catalogs intended to illustrate color or other design qualities.
      a. Architect will retain 1 copy.
   2. Submit additional copies required for 2 Owner's manuals per 017800.
   3. Additional copies for other contractors for purposes of information and coordination.
   4. Number in submittal sequence.
   5. Include contractor's stamp of approval, as evidence that drawings are approved in accordance with General Conditions (including field dimensions).
   6. Indicate field verified information as applicable.
   7. Provide clear space of not less than 40 square inches for Architect's stamp.

E. Provide an index of each page in submittal with space for notes and acceptance stamps.

F. Warranties:
   1. Where warranty is indicated, submit manufacturers' sample warranty with shop drawings.
   2. Submit actual executed warranties or guarantees per Section 017700 and 017800.

1.11 SAMPLES

A. Deliver samples of materials, equipment, assemblies and components as required by specifications to Architect/Engineer with delivery costs prepaid. At Architect's/Engineer's direction, remove samples after approval.
   1. Provide samples representative of actual product including finishes and other specified characteristics.
   2. Indicate type of construction and quality proposed for installation in Project.

B. Number Samples:
   1. Submit 3 samples unless otherwise specified.
      a. One set of samples to be retained by Architect.
   2. Provide additional samples for other contractors for purposes of information and coordination.

C. Maintain record samples of accepted samples with other record documents at project site.

1.12 LIST OF MATERIALS

A. Submit within 10 days after award of Contract and prior to purchase.

B. Submit 1 copy of complete list of materials, products, and equipment proposed to be used to Architect/Engineer for acceptance.

C. Do not order materials or equipment until proposed list of materials is accepted.

D. Materials and equipment are subject to Architect's and Owner's acceptance.

E. Arrange list in order of specification sections and in form indicated by Architect/Engineer.
   1. Items listed shall fully conform to project requirements and specifications.
   2. Specifically identify each material, product or equipment item by manufacturer, brand and model and other identifying designations including those where only 1 material or product is specified.
   3. Name products specified by reference standards, described by performance requirements and descriptive language.
   4. Do not list "as specified."

F. Where 2 or more makes or kinds of items are named in specifications (or additional names are listed in an addendum), state which particular make or kind of each item is to be provided.

G. If list is not received within 10 days, mechanical and electrical equipment under Divisions 21, 22, 23, 26, 27, and 28 will be as scheduled.

1.13 LIST OF SUBCONTRACTORS

A. Submit within 10 days after award of Contract, and prior to execution of Contract.

B. Submit with List of Materials.

C. Submit 1 copies of a complete list.

D. Do not execute subcontracts until proposed list of subcontractors is accepted by Owner, Architect and Engineers.

E. List to include the following information and be in form indicated by Architect.

1. Description of work proposed to be done by subcontract.
2. Names of subcontractors and major material suppliers proposed to perform portions of Work.
3. Names of sub-subcontractors of mechanical and electrical subcontractors.
4. Include proposed sub-subcontractors for other trades as requested by Architect and Engineers.

F. Proposed subcontractors or sub-subcontractors (and material supplier installers) shall be established, reputable firms of recognized standing with a record of successful and satisfactory past performance with type work and/or items proposed to be provided or installed by them.

1. Only those subcontractors (and sub-subcontractor when appropriate) who Architect and Owner have no reasonable objection to shall be used on Work.

G. Reasonable objection may arise when, in opinion of Architect or Owner, there exists a rational belief that proposed subcontractor, sub-subcontractor or material supplier:

1. Cannot provide materials, equipment, facilities or other products as specified or required by Contract Documents;
2. Cannot provide labor and skill necessary to accomplish part of Work for which they are proposed, including but not limited to quality of work;
3. Lacks adequate and appropriate experience for that part of Work proposed, including materials or methods required;
4. Has previously failed to perform in timely or satisfactory manner, including in cooperation and in necessary services after project completion;
5. Proposes deviations in materials or methods that are unacceptable to Architect or Owner, such as proposing materials or products that were not specified or not listed in addenda;
6. Cannot satisfactorily perform part of Work for which contractor is proposed, within time schedule, due to size of organization or existing work load.
7. Cannot demonstrate ability through quality of representative work to perform part of Work for which contractor is being considered;
8. Of questionable integrity;
9. Shows evidence of similar considerations bearing on possibility of unsatisfactory performance.

H. If Owner or Architect has a reasonable objection to person or entity proposed by Contractor to do portion of Work, Contractor must submit substitute to whom neither Owner nor Architect has reasonable objection; no increase in Contract Sum shall be allowed as a result of such substitution.

I. After acceptance of proposed list, no change of subcontractor, sub-subcontractor or supplier not objected to by Architect or Owner, shall be made, except for cause acceptable to Architect and Owner.

1. In event of a proposed change, submit reasons for change, in writing, along with alternate proposed subcontractor, sub-subcontractor or material supplier.
2. Proposed change is subject to conditions of this Article and requirements of General Conditions.

1.14 CLOSE-OUT SUBMITTALS

A. Submit documents specified under Section 017700 and 017800.

B. Submit 2 copies of operating instructions and maintenance manuals to Owner at time of Owner's instructions.

1.15 OTHER SUBMITTALS

A. Provide other required submittals as specified.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 013310
SUBMITTAL TRANSMITTAL

To: Hammel Green and Abrahamson, Inc.
Attn: Submittals Coordinator
420 5th St North, Suite 100
Minneapolis, Minnesota 55401-2338

From: (Contractor)
(Address)
(Address)
(City, State)

Owner: State of Minnesota **Date:**_____
Project: Minnesota State Capitol – Repairs, Restoration & Preservation
HGA Commission No.: 0476-061-00 **Previous Submittal Date:**_____

Incomplete submittals will be returned "Not Accepted." See General Conditions and 013300 for requirements.

The following submittal(s) is (are) attached for your review as required by the Contract Documents.

SHOP DRAWINGS

___ No. copies submitted. Submit minimum 1 copies per 013300; complete the following information:

☐Partial ☐Complete ☐Preliminary ☐Final

List of Drawings:_____

Specification Section:_____ Article & Paragraph:_____

Description of Item:_____

Manufacturer:_____

Supplier's Name:_____ Telephone Number:_____

PRODUCT DATA AND QUALITY CONTROL

___ No. copies submitted. Submit minimum 1 copies per 013300; complete the following information:

☐Partial ☐Complete ☐Preliminary ☐Final

List of Items:_____

Specification Section:_____ Article & Paragraph:_____

Description of Item:_____

Manufacturer:_____

Supplier's Name:_____ Telephone Number:_____

SAMPLES

___ No. copies submitted. Submit minimum 3 copies per 013300; complete the following information:

☐Partial ☐Complete ☐Preliminary ☐Final

List of Items:_____

Specification Section:_____ Article & Paragraph:_____

Description of Item:_____

Manufacturer:_____

Supplier's Name:_____ Telephone Number:_____

Submitted by: Company Name: _____
Phone: _____
Signature: _____

END OF SECTION

SECTION 014200
REFERENCES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Reference to standards and codes.

B. Related Sections:
   1. General Conditions.
   2. Section 016210 - Product Options and Substitution Requirements.

1.2 DEFINITIONS

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

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

C. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on Drawings or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.

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

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

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

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

H. "Installer": An installer is the 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.

I. The term "experienced," when used with an entity, means having successfully completed a minimum of 5 previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

J. 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 trades people of the corresponding generic name.

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

1.3 APPLICABLE GOVERNING STANDARDS

A. Code Overview: Code plans identifying Occupancy Types, Occupant Loads, Construction Type and Exiting Components should be consulted for additional information.
   1. Applicable State Building Code: (refer to drawings)

a. State Building Code which adopts by reference the 2012 International Building Code.
2. Fire Code:
   a. State Fire Code with reference to U.L. Fire Resistance Index.
3. Mechanical Code:
   a. State Mechanical Code, latest edition.
4. Energy Code:
   a. State Energy Code, latest edition.
5. Plumbing Code:
   a. State Plumbing Code, latest edition.
6. Electrical Code:
   a. National Electrical Code (NEC), latest edition.
7. Elevator Code:
   a. State Building Code which adopts by reference and amends the American National Safety Code for Elevators and Escalators adopted by the American National Standards Institute and the American Society of Mechanical Engineers, ASME A17.1-2004 with addenda and supplement, A17.3-2002, A17.5-2004, A18.1-2005, A90.1-2003 and B20.1-2003.
   b. Chapter 1307
8. Accessibility Code:
   a. State Building Code. ADA guidelines are used where these are more stringent and not in conflict with code requirements.
9. Life Safety Code:
   a. NFPA Life Safety Code 101 - 2000 edition, is consulted when building code is silent on an issue.

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. Conflicting Requirements: 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.
   1. 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.
   2. If Contractor knowingly performs Work contrary to such laws, ordinances, rules and regulations without notice to Architect, consequent costs and damages will be paid by Contractor.

D. Copies of Standards: Each entity engaged in construction on Project must 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 and make them available on request.

E. Certificate: For products specified in accordance with a Federal Specification, ASTM Standard, American National Standards Institute or similar association standards, upon request by Architect, the Contractor must provide an acceptable affidavit by independent testing laboratory, or other source approved by the Architect, certifying that product furnished for this Project complies with the particular standard specifications.
   1. Where necessary, requested or specified, supporting test data shall be submitted to substantiate compliance. The manufacturer is subject to Architect's acceptance.

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

END OF SECTION

SECTION 016210
PRODUCT OPTIONS AND SUBSTITUTION REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Procedures, requirements and limitations for considering substitutions.
   2. Criteria for selecting product options and substitutions.

1.2 SUBMITTALS

A. Submit requests for substitution in writing to Architect at least 10 calendar days prior to bid date and hour. Requests received after this time will not be considered.

B. Clearly define and describe proposed substitute product including following items:
   1. Fully completed Section 016211 - Substitution Request Form.
   2. Manufacturer's printed information supporting claim that proposed product meets specified requirements. Provide following as applicable:
      a. Literature Specifications Drawings Cut Sheets Performance data List of reference projects of similar size, value and complexity Model numbers Other information necessary to completely describe item.
   3. Provide a point by point comparison between key features of specified Basis of Design item and proposed substitution.
   4. Provide submitted materials marked with Article and Paragraph references from Specification using highlighter, marker and flags on pages to facilitate review and show that substitution meets specified requirements.
   5. Provide a letter indicating requestor has reviewed Contract Documents and examined site (if needed) and that proposed substitution meets specified requirements.

C. Accepted substitutions will be published in writing. No information or indication of acceptance will be provided by means other than written Addendum during bidding or Architect’s written construction administration document following bidding. Refer to “Limitations on Substitutions after Bids or During Construction" in this Section.

D. Bid and construct according to Contract Documents unless approval of substitution is provided in writing.

E. Architect is not obligated to state reasons for rejecting substitution.

1.3 DEFINITIONS

A. "Product" means material, equipment, assembly, system, manufacturer, brand, trade name, element, item or similar as applicable.
   1. Provide new products free from defects and deficiencies unless otherwise noted.
   2. Provide components and accessories necessary for a complete system by same manufacturer unless otherwise specified.

B. Terms such as “approved substitute”, "equal to", "accepted by", "approved by", or other synonymous terms mean that acceptance of proposed product is subject to approval by Architect after submittal requirements are met. Architect’s decision is final and binding.

C. Available Manufacturers: See below.

D. Except where "no substitutions", "same as existing" or "match existing" are noted, term "or approved substitute" is implied throughout, subject to prior approval conditions specified including where the term "Available Manufacturers" is included.

PART 2 MATERIALS

2.1 PRODUCTS

A. Architect and Owner reserve right to accept or reject proposed product. Should a proposed product be unable to meet requirements to satisfaction of Architect, product shall not be used. No additional compensation will be allowed for required Work resulting from use of product accepted by Addendum.

B. Use only one brand, manufacturer, source or type for like products unless otherwise approved or specified. Contractor is obligated to do so unless otherwise approved in writing.

C. Provide pricing based on products listed in Contract Documents. Contract award is based on use of specified products or substitutions approved prior to bidding or pricing.

   1. By execution of Contract, Contractor agrees and understands Work will be accomplished with products specified or accepted by substitution.

D. Basis of Design Products:

   1. Reference to "Basis of Design" and a named specific product or manufacturer is intended to establish criteria for use of that product and manufacturer based on that products published information whether or not those criteria are explicitly stated in Specifications.
   2. Criteria may establish higher performance requirement than specified reference or performance standards. Such reference is intended to establish minimum level of quality, standard of design, function, appearance, type, strength, durability, construction, efficiency, sound level, finish, appearance, availability, service and similar characteristics determined necessary for Project.
   3. Specification criteria including basis of design products are considered as a whole.
   4. Other products or manufacturers listed meet features, performance, appearance and other criteria established by that product or manufacturer even if product must be customized to meet those criteria.
   5. When other products are listed in a Section those products may be used if they meet entire specification criteria including criteria implied by product listed as basis of design. Meeting some requirements but not meeting criteria established by basis of design product does not qualify as meeting specified requirements.
   6. Products or manufacturers accepted for substitution will be acceptable provided they fully comply with requirements and match basic and essential criteria of product used for basis of specification or design, including level of fabrication quality, as determined by Architect.

E. Reference Standards for Products:

   1. When references to Federal Specification, ASTM Standard, American National Standards Institute (ANSI) or similar association standards are listed for product quality, provide an acceptable affidavit certifying that proposed substitution for this Project meets with same standard.
   2. Submit supporting test data to substantiate compliance.

F. Substitute products shall:

   1. Be available in same range of colors, textures, dimensions, gauges, types, and finishes as specified product.
   2. Be equal to specified item in strength, durability, efficiency, serviceability, ease and cost of maintenance.
   3. Be compatible with building design.
   4. Not necessitate design modifications.
   5. Not impose additional work or require changes in work of Prime Contractor, or other Subcontractor, vendor, or materials supplier.
   6. Not add cost to Owner.
   7. Be similar in essential fabrication features.

G. Contractor, supplier or manufacturer providing accepted substitute product shall bear cost of required modifications to spaces, services, utilities and other features as result of accepting substitute products, including but not limited to:

   1. Larger capacity mechanical or electrical service, devices or utilities resulting from acceptance of product for bidding purposes.

2. Modification to pipes, conduits, ducts, and controls for conveying, distributing, and controlling those services or utilities.
3. Modification to insulation, wrappings, coatings, or other integral features of lines or items conveying those lines.

H. Timely Placement of Product Orders: Place product orders in a timely manner, within ten days after acceptance of submitted list of materials.

2.2 LIMITATIONS ON SUBSTITUTIONS AFTER BIDS OR DURING CONSTRUCTION

A. Intent is to limit unnecessary substitutions after bids. Changes will not be allowed to accepted list of products, except when specified or accepted product subsequently is determined as not meeting requirements of Contract Documents or product becomes unavailable, and then only under following conditions:

1. Orders were placed in timely manner as required after list of materials is accepted. No excuse or proposed substitution will be considered for products due to unavailability unless proof is submitted that firm orders were placed in a timely manner.
2. Reason for unavailability is beyond control of Contractor: prolonged strikes or lockouts which will delay Project to an extent unacceptable to Owner, bankruptcy, discontinuance of a product, delays or Acts of God or other similar reasons.
3. Request for substitution is submitted in writing within 10 days after date Contractor becomes aware product does not comply with specifications or has become unavailable, accompanied by supporting evidence.
4. No extra cost to Owner.
5. Substitution does not compromise design intent or quality required.
6. Substitute product is acceptable to Owner and Architect.
7. 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.
8. Requested substitution does not require revisions to Contract Documents.
9. Requested substitution is consistent with the Contract Documents and will produce intended and indicated results.
10. Substitution request is fully documented and properly submitted.
11. Requested substitution will not adversely affect Contractor's Construction Schedule.
12. Requested substitution has received necessary approvals of authorities having jurisdiction.
13. Requested substitution is compatible with other portions of Work.
14. Requested substitution has been coordinated with other portions of Work.
15. Requested substitution provides specified warranty.
16. If requested substitution involves more than one trade, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to installers involved.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 016211
SUBSTITUTION REQUEST FORM

To: **Hammel, Green and Abrahamson, Inc.**
420 5th St North, Suite 100
Minneapolis, Minnesota 55401-2338
Attention: Project Coordinator

Project: Minnesota State Capitol – Repairs, Restoration & Preservation

HGA Comm. No.: 0476-061-00 **Date Received:**_____

Specification Section Number and paragraph:_____

Drawing and details affected:_____

Proposed Substitution:_____

Manufacturer:_____

Product (model, pattern, etc.):_____

WHY IS SUBSTITUTION BEING SUBMITTED? (Select one of the following):

- ☐ Pre-Bid Substitution (Prior Approval) Bid Date:
- ☐ Specified product is not available. Explain.
- ☐ Cost savings to Owner. Indicate comparative cost analysis.
- ☐ Other: Explain.

EFFECTS OF PROPOSED SUBSTITUTION: Answer the following questions and attach explanations.

Does substitution affect dimensions indicated on Drawings?
☐NO ☐YES, explain:

Does substitution affect Work of other Sections?
☐NO ☐YES, explain:

Does substitution require modifications to design, changes to Drawings, or revisions to specifications to be incorporated into the Project?
☐NO ☐YES, explain:

Attach list of at least 3 projects where proposed substitution has been used within past 12 months; include name, address, and telephone number of Owner and Architect.

CONTRACTOR'S / BIDDER'S REPRESENTATION

Undersigned accepts responsibility for coordination of proposed substitution and accepts all additional costs resulting from the incorporation of proposed substitution into the Project per Section 016210.

SUBMITTED BY:

_____

_____

Fax No: _____

For Architect's use:

☐ Accepted ☐ Not Accepted
☐ No Action Required
☐ Submission: Incomplete
☐ Too Late

Reviewed by/date:_____

Comments:_____

Subcontractor's signature and date:_____

Contractor's signature and date:_____

SECTION 017329
CUTTING AND PATCHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Cutting, demolition, removal work, patching and restoration of work as necessary to accomplish and complete all work under the Contract, including any relocation or reuse of existing materials, equipment, systems, or other work, as well as the disposition of salvaged materials or debris.
   2. This Section applies to all work under the Contract, including general construction, mechanical and electrical work.

B. Related Sections:
   1. Refer to Sections 011100 for special requirements, protection, constraints, timing of work, scheduling of work, enclosures and similar requirements relating to this Section.
   2. Section 024119 – Selective Demolition.

1.2 DESCRIPTION

A. Drawings generally indicate the extent of demolition, removals, relocations and cutting. The drawings shall not be construed as indicating all required work, nor indicating all conditions or details which might be encountered to accomplish the work of this Contract.
   1. The Contractor and subcontractors must examine the spaces themselves to determine the actual conditions and requirements. All removals, demolition, cutting, restoration, new installations and other work shall be accomplished to transform the existing spaces and conditions to the new conditions required under the Contract, as well as to accomplish all tie-in work of new to existing.

B. It is the intent that unless specifically shown on the general construction type drawings (i.e., architectural and structural) and schedules, or is inherent in the work to be accomplished under the general construction work of the area, that the mechanical and electrical subcontractors shall perform the demolition, cutting, removals, relocations, patching and restoration as will be required to accomplish the work under their subcontracts.
   1. All work shown or indicated on the general construction drawings and schedules shall be accomplished by the General Contractor.

C. Except for general demolition of entire areas it is the intent that at each area, or space, the Contractor and each subcontractor must make the removals, perform cutting or demolition and accomplish relocations of work normal to their trades (i.e., Mechanical Subcontractor removes or relocates piping, ductwork and similar; Electrical Subcontractor removes or relocates panelboards, conduit, lighting and similar).
   1. At areas of general demolition of the entire spaces, the Mechanical and Electrical shall make removals or work normal to their trades or may be called for, for reuse or relocation, make any relocations and cut-off, terminate, cap or otherwise discontinue services that will be abandoned or removed in the space. The General Contractor must then demolish or remove all abandoned or unwanted electrical or mechanical materials, items or elements in the area.

1.3 SUBMITTALS

A. Schedule: Submit schedule indicating proposed sequence of operations for demolition work to Owner's Representative for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
   1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.

2. Coordinate with Owner's continuing occupation of portions of existing building and with Owner's partial occupancy of completed new addition.

1.4 QUALITY ASSURANCE

A. Skilled Mechanics: Accomplish all work of cutting, removal, demolition, relocation, patching and other restoration by using only mechanics skilled in the trade. If necessary, sublet the work to skilled contractors or subcontractors.

B. Safety: The Contractor is fully responsible for the safety of the existing buildings and personnel, as well as new construction as a result of work, procedures, operations or activities of this Contract.

C. Structural Work: Where the work of removals, demolition, cutting and similar work involves structural consideration, extreme care shall be exercised to avoid damage and preserve the safety of the structure and all personnel.

1. Particular care must be taken where the demolition or removals occur adjacent to occupied areas. Utilize (employing if necessary) competent and qualified technical assistance to develop safe methods and techniques to accomplish the work, including for temporary shoring and supports, methods of removal and other considerations.
2. All permanent or temporary supports shall be so designed and placed by considering all loads and shall be carried down to sound bearing.

D. Hazardous Substances: Where the work of removals, demolition, cutting and similar work involves possible hazardous substances and/or harmful physical agents, such as asbestos fibers, or polychlorinated biphenyl (PCB), extreme care shall be exercised to avoid damage and preserve the safety of all personnel. Contractor must stop the work and notify the Owner and Architect, in accordance with provisions of AIA General Conditions Article 10.1.

E. Remove resilient sheet vinyl and tile and cutback asphaltic adhesives in accordance with Resilient Floor Covering Institute (RFCI) "Recommended Work Practices for the Removal of Resilient Floor Coverings", July 1990.

1.5 COORDINATION

A. Coordination: Coordinate all work of this Section with all subcontractors so the work will progress without interruption and minimum delays. The Contractor must also coordinate and schedule the work with the Owner where possible disturbance may occur and where relocations or other potential disruptions of the Owner's functions and services may occur. All work affecting the Owner's functions and services shall be performed at times acceptable to the Owner.

PART 2 DISPOSITION OF MATERIALS

2.1 UNSALVABLE MATERIALS

A. Remove unsalvable materials in a manner that will avoid damage to materials or equipment which will remain. Completely remove and legally dispose away from the site.

2.2 SALVABLE MATERIALS TO BE RE-USED IN THE WORK

A. Salvable materials and items designated for reuse or relocation shall be removed by the applicable trades and relocated to the new location. If the new location is not ready to receive the relocated item, it shall be stored and protected from damage until incorporated into the new work or remodeled area. If the Owner is unable to forego the use of any existing items at the normal time for relocation until other facilities are available to the Owner, make all preparations for the item and delay relocation until a time approved by the Owner.

B. Carefully remove, salvage, clean and preserve materials, equipment and other items indicated to be reused, or which will be needed for reuse to match existing work. Exercise extreme care in removals to prevent damage or to make materials unsuitable to reuse. For materials shown or called for to be reused and which are damaged, replace with equivalent and matching work.

C. Where brick from existing building is required for patching, exercise care in removing brick from existing building to preserve for reuse. Do not reuse broken brick. After removal clean all mortar from all sides of brick, carefully stockpile and protect to insure brick is available for reuse. Stockpile off site, if space is not available at site, and cover or otherwise protect from soil or damage. Stockpile on suitable platform (not on earth).

2.3 SALVABLE MATERIALS TO BE STORED BY THE OWNER

A. The Owner will mark or tag existing materials, equipment or other items Owner wishes to retain. Salvable materials and items designated or marked to remain the property of the Owner shall be carefully removed by the applicable trades, protected from damage and stored adjacent to the removal area as directed.

B. Consult the Owner for any salvage the Owner may wish to retain and the salvageability of all items. Carefully remove and salvage any materials the Owner wishes to retain. Remove finish hardware from the item or material taken out of the building and turn over to Owner. Cleaning or restoration of the Owner's salvage materials is not required.

C. Removal from the area and the site to the Owner's storage will be by the Owner.

PART 3 EXECUTION

3.1 INSPECTION

A. Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

B. After uncovering, inspect conditions affecting performance of work.

C. Beginning of cutting or patching means acceptance of existing conditions.

3.2 TEMPORARY PROTECTION

A. Provide temporary bracing, shoring, needling and support during demolition, cutting, remodeling and related new construction as necessary for the execution of the Work and the protection of persons and property. Perform all work with appropriate supports, protection and methods to prevent collapse, settling or damage to property or persons. Provide adequate supports for the loads to be carried, with loads properly distributed, including to lower levels and sound bearing, if necessary.

B. Provide protective coverings and enclosures necessary to prevent damage to existing spaces and materials to remain. Protect openings in exterior walls and roofs so as to prevent damage from water and the elements and prevent excessive heat loss from the existing buildings. Coordinate work and removals at exterior, including roof, by scheduling and performing to maintain watertight installation. Seal areas left temporarily unfinished to prevent damage to existing roof or other materials and furnishings of existing building.

C. Provide dustproof temporary enclosures (including above ceilings) separating areas under demolition and remodeling from the remainder of the building as well as temporary filters at duct work. Provide temporary hinged doors in temporary enclosures where necessary. Temporary and permanent doors shall be completely sealed with tape or other suitable material during demolition work and shall remain sealed until dust has settled.

D. Provide protection from elements for that portion of the Project which may be exposed by cutting and patching work, and maintain excavations free from water.

3.3 DEMOLITION AND CUTTING

A. Demolish and remove existing construction as shown, indicated or required to be removed to accomplish the Work. Where new Work is to be installed in or adjacent to existing construction or existing work is to be replaced, remove or cut the existing construction as necessary to complete the Work of the Project.

B. Execute work with care. Existing construction that is to remain which is loosened, cracked, or otherwise damaged or defaced as a result of the Work and is unsuitable for use intended shall be removed and replaced at no additional cost to the Owner.

1. Many components of the building are historic. Preservation of historic materials is of high priority. All removal and installation of systems shall be coordinated with the Architectural drawings. Diligent effort is to be used when coordinating any removal or installation of systems. The contractor shall inform the Architect and Engineer of impact on any historical material that is not noted on the architectural drawings.
2. Existing systems may be concealed within walls and vertical chases that are noted for demolition. The Contractor shall be responsible to identify the locations of all systems within walls or shafts and to protect those systems that serve occupied spaces in the building at the Terrace level and all upper floors. The Contractor shall inform the Architect and Engineer of impact to building systems serving occupied spaces.

C. Debris from upper levels shall be transported to ground in covered chute or other approved means. No free-fall debris removal is permitted. Moisten debris with spray where practical. Take all precautions to minimize dust.

D. Clean demolition areas and remove debris, waste and rubbish from the building at the conclusion of each day's work. Transport debris and rubbish in such a manner so as to prevent spread of dust. Do not store or permit debris storage at site. Do not burn debris, rubbish or waste at the site. Keep adjacent areas unencumbered and clean. Keep walks and similar areas broom clean.

3.4 PATCHING, REMODELING, REPLACEMENTS AND RESTORATION

A. Patch or otherwise restore disturbed existing construction as indicated on the drawings and schedules, or as otherwise required to restore the work and surfaces. Patching or restoration shall be carried to natural breaks (i.e., corners) wherever possible. Where existing construction is removed, cut or otherwise disturbed by Work of the Project, patch defective and incomplete surfaces. Repair any damage to existing construction which is to remain.

B. Patching work shall be done by skilled mechanics experienced in the particular type of work involved. Patching work shall conform to the standards of the Specifications where applicable and where not specified, work shall conform to the highest standards of the trade.

C. Patch existing construction to match existing work (unless otherwise called for) except provide new materials and accomplish as for new work. Examine existing surfaces to be patched before proceeding with the work. Report all conditions where existing materials, colors and finishes cannot be matched to the Architect and Owner, and do not proceed until instructions have been given.

D. Existing construction that has been damaged as a result of the Work shall be repaired to an extent and as required to match adjacent existing undamaged construction.

E. Thoroughly clean and prepare all surfaces to receive new finish or covering. Completely remove dirt, dust, grease, oil, paint, loose materials and soil. Clean, etch where necessary, and place surfaces in most suitable condition for the finish.

3.5 ADJUSTMENTS

A. Where partitions are removed, patch floors, walls, and ceilings, with finish materials to match existing.

1. Where removal of partitions results in adjacent spaces becoming one, rework floors and ceilings to provide smooth planes without breaks, steps, or bulkheads.
2. Where extreme change of plane of two inches or more occurs, request instructions from Architect as to method of making transition.

B. Trim and refinish existing doors as necessary to clear new floors.

3.6 MECHANICAL AND ELECTRICAL WORK EXPOSED

A. Where unknown mechanical piping, ductwork or electrical conduit is exposed during removal of partitions, walls or floors and ceilings, the removal or rerouting shall be accomplished by the Mechanical or Electrical Subcontractor as applicable. Locate mechanical and electrical work where directed and connect to maintain all functions in proper operation. Abandoned piping may be left in place where it is concealed in floors or walls, providing that it is disconnected from its source and capped. There shall be no "dead end" water, sewer, gas, or vent piping existing in the completed work.

B. Accomplish removals, capping or otherwise terminating services which are abandoned or need to be abandoned, and rerouting of mechanical and electrical work without additional cost to the Owner, whether shown or noted on drawings or otherwise encountered.

3.7 WORK OF EACH CONTRACT

A. The Contractor and each subcontractor must carefully review the Contract Documents including those primarily for other trades with respect to the coordination of the demolition, removal and remodeling work and perform such removals normal to their trades as may be shown, noted or otherwise required. Cutting and patching incidental to demolition, removal and/or remodeling of general construction work shall be construed as the work of the General Contractor when shown or indicated on the general construction drawings or schedules or specifically noted or called for on documents primarily for other trades as being accomplished by the General Contractor. Other subcontractors (mechanical or electrical) are responsible for such other cutting, demolition, patching, replacement and restoration as may be required to accomplish their part of the Work.

3.8 FLOOR PREPARATION (EXISTING SLABS)

A. Prepare existing concrete slabs for the installation of various floor finish materials, i.e., VCT, ceramic and quarry tile, carpet (glue-down), concrete topping.

B. Roughen surfaces which are glossy or which have loose surface material or curing sealers by sanding, scarifying or acid etching as required. Remove surface material that is not compatible with adhesive. Clean thoroughly to remove all oil, dirt, sealer materials and dust.

3.9 CLEANING

A. Perform periodic and final cleaning as specified in Section 017700 - Closeout Procedures.
   1. Clean Owner-occupied areas daily.
   2. Clean spillage, overspray, and heavy collection of dust in Owner- occupied areas immediately.

B. At completion of work of each trade, clean area and make surfaces ready for work of successive trades.

C. At completion of alterations work in each area, provide final cleaning and return space to a condition suitable for use by Owner.

END OF SECTION

SECTION 017420
CONSTRUCTION WASTE DISPOSAL AND RECYCLING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes: This Section includes required recycling and recovery of the following waste materials and applies to listed waste materials produced during the Work:

1. Concrete and Masonry: Clean concrete, brick, rock, and masonry.
2. Metals: Metal scrap including iron, steel, copper, brass, and aluminum including piping, fasteners, wiring, ductwork and sheet metal goods.
3. Untreated Wood: Unpainted, untreated dimensional lumber, timber beams, engineered wood products, plywood, oriented strand board, Masonite, particleboard, wood shipping pallets, and crates.
4. Gypsum Wallboard Scrap: Excess drywall construction materials including cuttings, other scrap, and excess materials.
5. Paper and Cardboard: Discarded office refuse including unwanted files, correspondence, etc. Clean, corrugated cardboard used for packaging, etc.
6. Land Clearing debris, plastic, glass , carpet, and insulation.

B. Non-Recyclable Waste: Collect and segregate non-recyclable waste for delivery to a permitted landfill site.

1. Mixed Solid Waste: Solid waste commonly collected as a municipal service, exclusive of waste materials listed above.

1.2 DEFINITIONS

A. Waste Materials are defined as large and small pieces of listed materials which are excess to contract requirements and generally include materials to be recycled and/or recovered from existing construction and items of trimmings, cuttings and damaged goods resulting from new installations, which cannot be effectively used in the Work.

B. Recycling is defined as the process of collecting and preparing recyclable materials and reusing them in their original form or in manufacturing processes that do not cause the destruction of recyclable materials and reusing them in their original form or in manufacturing processes that do not cause the destruction of recyclable materials in a manner that precludes further use.

C. Recovery is defined as any process that reclaims materials, substances, energy, or other products contained within or derived from waste on-site. It includes waste-to-energy, composting, and other processes.

1.3 SUBMITTALS

A. Construction Waste Management Plan: Before start of construction, submit a construction waste management plan for approval of Contracting Officer's Representative indicating how Contractor proposes to collect, segregate, recycle, and recover at least 75% of construction wastes and debris generated by the Work. Submit documentation indicating compliance with regulations specified under "Quality Assurance" article below. Include a list of recycling facilities to which indicated recyclable materials will be sent for recycling. Identify materials that are not recyclable or otherwise recoverable that must be disposed of in a landfill or other means acceptable under governing State of Minnesota and local regulations. List permitted landfills and/or other disposal means to be employed. Indicate instances where compliance with requirements of this specification does not appear to be possible and request resolution from the Contracting Officer through the Contracting Officer's Representative.

B. Delivery Receipts: Provide to the Construction Quality Manager delivery receipts for waste materials salvaged and sent to permitted waste materials processors or recyclers within 48 hours of delivery that indicate the location and name of firm accepting recyclable waste materials, types of materials, net weights of each type, date of delivery and value of materials.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable requirements of the State of Minnesota and applicable local ordinances and regulations concerning management of construction, demolition, land clearing, inert, and yard trash debris and subsequent modifications and amendments to same.

B. Disposal Sites, Recyclers, and Waste Materials Processors: Use only facilities properly permitted by the State of Minnesota, and by local authorities where applicable.

C. Pre-Construction Waste Management Conference: Prior to beginning work at the site, schedule and conduct a conference to review the Construction Waste Management Plan and discuss procedures, schedules and specific requirements for waste materials recycling and disposal. Discuss coordination and interface between Contractor and other construction activities. Identify and resolve problems of compliance with requirements. Record minutes of the meeting, identifying conclusions reached and matters requiring further resolution. Maintain waste management as an agenda item at future construction meetings.

   1. Attendees: Contractor and related Contractor personnel associated with work of this section, including personnel in charge of the waste management program; Construction Quality Manager; Architect; material suppliers where appropriate; and such additional Owner personnel as Owner deems appropriate.
   2. Plan Revision: Make revisions to Construction Waste Management Plan agreed upon during the meeting and incorporate resolutions agreed to be made subsequent to the meeting. Submit revised plan to Architect for approval.

D. Implementation: Designate an on-site party responsible for instructing workers and implementing Construction Waste Management Plan. Distribute copies of Construction Waste Management Plan to job site foreman and each subcontractor. Include waste management and recycling in worker orientation. Provide on-site instruction on appropriate separation, handling, recycling, and recovery methods to be used by all parties at the appropriate stages of the work at the site. Include waste management and recycling discussion in pre-fabrication meetings with subcontractors and fabricators. Also include discussion of waste management and recycling in regular job meetings and job safety meetings conducted during the course of work at the site.

1.5 STORAGE AND HANDLING

A. Site Storage: Remove materials for recycling and recovery from the work location to approved containers or storage area as required. Failure to remove waste materials will be considered cause for withholding payment and termination of Contract.

B. Position containers for recyclable and recoverable waste materials at a designated location on the Project Site. If materials are sorted on site, provide separate collection containers or storage areas for not less than the following materials:

   1. Concrete and masonry.
   2. Metals.
   3. Untreated lumber.
   4. Gypsum wallboard scrap. (edit to suit project)
   5. Paper and cardboard.

C. Change-out loaded containers for empty containers as demand requires.

D. Handling: Deposit indicated recyclable, and recoverable materials in storage areas or containers in a clean (no mud, adhesives, solvents, petroleum contamination), debris-free condition. Do not deposit contaminated materials into the containers until such time as such materials have been cleaned.

E. If the contamination chemically combines with the material so that it cannot be cleaned, do not deposit into the recycle containers. In such case, request resolution by the Construction Quality Manager for disposal of the contaminated material. Directions from the Construction Quality Manager do not relieve the Contractor of responsibility for compliance with all legal and regulatory requirements for disposal, nor shall such directions cause a request for modification of the Contract.

1.6 PROJECT/SITE CONDITIONS

A. Environmental Requirements: Transport recyclable and recoverable waste materials from the Work Area to containers and carefully deposit in the containers without excess noise and interference with other activities, to minimize noise and dust.

   1. Do not place recyclable waste materials on the ground adjacent to a container.

B. Existing Conditions: Coordinate with “Instructions to Bidders” and “Specific Project Requirements”.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 WASTE MANAGEMENT

A. General: Implement waste management procedures in accordance with approved Construction Waste Management Plan. Maintain procedure throughout the life of this Contract.

B. Source Separation On- or Off-Site: Either separate, store, protect, and handle at the project site all identified recyclable and recoverable waste products to prevent contamination of materials and maximize recycleability and recoverability of materials. Or mix all identified recyclable and recoverable waste products for separation off-site.

C. Arrange for the regular collection, transport from the site, and delivery to respective approved recycling centers of indicated recyclable waste materials. Maintain records accessible to the Architect for verification of construction waste materials recycling and recovery.

D. Delivery Receipts: Arrange for timely pickups from the site or deliveries to approved recycling facilities of designated waste materials to keep construction site clear and prevent contamination of materials. Keep and maintain records of deliveries to recycling facilities and pickups of waste materials at the site by others as specified above.

3.2 RECYCLABLE WASTE MATERIALS HANDLING

A. General: the following paragraphs supplement handling requirements for various materials identified for classification and recycling listed in Part 1 “Summary” article above.

B. Concrete and Masonry: Free of metals, woods and other contaminates. If possible during demolition, crush existing concrete and concrete masonry units on-site into aggregate size. Store crushed material on-site in clean area to avoid contamination from other materials or building processes. Reuse on-site crushed material for fill, for stabilizing soils, or as base and subbase materials. If crushing on site is impractical, store material during demolition processes on site in clean, uncontaminated area. Transport concrete and masonry materials to a certified concrete recycler as needed.

C. Metals: Cut items to lengths and sizes to fit within the container provided when necessary. Where there is sufficient quantity of a specific recyclable waste item (for example; salvaged metal roofing or duct work), make special arrangements for items to be bundled, banded or tied, and stack in a designated location for a special pick-up. Coordinate special arrangements with the Construction Quality Manager.

D. Untreated Wood: Salvaged wood materials to be free of metals, concrete, gypsum wallboard, insulation, and other contaminating materials. Stack dimensional wood into like piles. For example, store 2 x 4s with other 2 x 4s, and 2 x 6s with other 2 x 6s. Also, if quantity is sufficient, separate piles into lengths of 4-foot increments. Reuse lumber on site as studs, backing, blocking or other uses where appropriate. Stack non-dimensional wood in piles for possible reuse on-site or transport off-site. Depending on size of lumber, recycle or chip wood for plant mulch. If wood materials cannot be used on site, transport to a certified wood recycler or reuse center.

E. Gypsum Wallboard Scrap: Separate gypsum wallboard from other wastes. Dispose of waste gypsum wallboard off-site at a gypsum reclamation or recycling facility, or on-site as a soil amendment.

1. For on-site application as a soil amendment, incorporate waste gypsum wallboard in landscape areas under construction, at a rate of 50 pounds per 1000 square feet, or approximately one ton per acre.
   a. Material must be unpainted gypsum wallboard from new construction, ground to reduce material to a fine particle size (70% passing a 100-mesh screen), and must be fully incorporated into the soil surface.

F. Paper and Cardboard: Classify and handle waste paper goods as follows:

1. Bond Paper: General office quality paper used for specifications, correspondence, copiers, PC laser printers, and FAX machines. Collect in separate container at each workstation and deposit loose in appropriate recycle container as required.
2. Newsprint: Newspapers and tabloid style advertising (slick finish magazines and advertising materials are not typically recyclable). Collect in single location and deposit as required in appropriate recycle container.
3. Diazo Prints (drawings): Set up single location for collection. Roll together to minimize space. Deposit as required in appropriate recycle container.
4. Cardboard and paperboard cartons and boxes: Knock-down, fold flat, and deposit in appropriate recycle container.

G. Other Items: Where recyclability classification of any given waste material is unclear, verify with the Construction Quality Manager.

END OF SECTION

Construction Waste Recycling Economics Worksheet

Option 1: Using a Commercial Hauler

Cost of Recycling/Recovery

	Disposal			Handling Costs					
Material	**Tons or Cubic Yards**	**Revenue or Tip Fee (1)**	**Subtotal**	**No. of Loads**	**Hauling Fee per Load**	**Container Rental Day/Wk/Mo**	**No. of Days/ Wks/Mos**	**Subtotal**	**Total Cost**
Totals									

(1) If paid a revenue for the material, enter it as a negative number.

Cost of Landfilling

	Disposal			Handling Costs					
Material	**Tons or Cubic Yards**	**Revenue or Tip Fee (1)**	**Subtotal**	**No. of Loads**	**Hauling Fee per Load**	**Container Rental Day/Wk/Mo**	**No. of Days/ Wks/Mos**	**Subtotal**	**Total Cost**
Non-Recyclable Waste									

Option 2: Self Hauling Materials

Cost of Recycling/Recovery

	Disposal			Handling Costs				
Material	Tons or Cubic Yards	Revenue or Tip Fee (1)	Subtotal	No. of Loads	Hours per Load	Truck Costs per Hour incl. Labor	Subtotal	Total Cost
Totals								

(1) If paid a revenue for the material, enter it as a negative number.

Cost of Landfilling

	Disposal			Handling Costs				
Material	Tons or Cubic Yards	Revenue or Tip Fee (1)	Subtotal	No. of Loads	Hours per Load	Truck Costs per Hour incl. Labor	Subtotal	Total Cost
Non-Recyclable Waste								

Total Cost for Recycling/Recovery and Landfilling of Materials	

SECTION 017700
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Closeout procedures.
   2. Systems and equipment testing.
   3. Instructions to Owner.
   4. Clean-up.

B. Related Sections:
   1. Section 007300 – Specific Project Requirements (*by CM, under JE Dunn Front End*)
   2. Section 017800 – Closeout Submittals.

1.2 SUBSTANTIAL COMPLETION AND OWNER OCCUPANCY

A. Owner has urgent need to occupy Project to commence its intended use.

B. Plan an efficient, orderly and coordinated completion process including organizing, scheduling and coordinating the following:
   1. Work of contractor's own forces.
   2. Work of subcontractors.
   3. Establish firm commitments for on-time completion
   4. Owner's needs for accommodations and time to occupy project during closeout per schedule of Substantial Completion and final completion specified in JE Dunn Front End documents.

C. After Substantial Completion expedite completion of remaining work in an organized, efficient manner that maintains quality standards. Perform such work according to following requirements:
   1. Scheduled work in advance with Owner.
   2. Perform Work in occupied spaces when space is not in use, such as after hours in administrative areas or public spaces when public use hours are over for the day, unless otherwise approved by the Owner.
   3. When necessary, use overtime to accomplish work not able to be completed during normal work hours at no extra cost to the Owner.
   4. Perform Work in occupied areas in a manner and at such time as will not significantly interfere with, hamper or inconvenience Owner's program or functions.

1.3 PROJECT CLOSEOUT

A. Insurance: Refer to General Conditions.
   1. Upon completion of work and written acceptance by Owner, provide a Certificate of Insurance indicating specified Completed Operations insurance will be provided a minimum of one year after Owner's acceptance of entire Project.
   2. Specified Property Insurance shall be maintained until final acceptance by Owner of entire Project.

B. Supplemental Agreements: Resolve supplemental agreements prior to final payment, including adjustment of allowances.

C. Consent of Surety: Refer to General Conditions – obtain consent of surety prior to reduction in retained percentage and prior to final payment.

D. Broken Glass: Repair.

E. Guarantees - Warranties: Refer to General Conditions for general guarantee requirements.
   1. In addition to general guarantee, provide written guarantees specified in technical sections of Specifications per Section 017800.

F. Test Reports and Certificates: Refer to Section 017800.

G. Retention of Records: Retain records required by law and good business practice.

H. Record Set of Drawings:
   1. Refer to General Conditions and Section 017800.
   2. Deliver record set to Architect upon Final Completion of Project.
   3. Review set with Architect to clarify or explain changes that may be necessary.

I. Temporary Utilities:
   1. Refer to Section 007300 (By CM).

J. Sanitary Facilities:
   1. Refer to Section 007300 (By CM).
   2. Remove temporary fixtures and restore rooms as specified.

K. Temporary Facilities:
   1. Remove as work progresses and facilities are no longer needed at time acceptable to Architect.
   2. Prior to final payment, remove temporary sheds, offices, fences (including perimeter fence), barricades, surplus materials, debris and other material or items not part of Project.

L. Extra Materials: Refer to Section 017800

M. Construction Cores and Keys:
   1. At time of Substantial Completion, just prior to occupancy, replace construction cores and install permanent cores in locks.
   2. Thereafter, access to spaces will be provided by the Owner.

N. Identification of Equipment:
   1. Prior to Substantial Completion, provide identification tags or plates, or other identification means, as specified under Technical Sections of Specifications, such as at valves, panelboards and similar items.
   2. Apply directions on plates for circuit data and similar information.

1.4 SYSTEMS AND EQUIPMENT TESTING

A. Test equipment and systems to demonstrate each system and piece of equipment is installed and operating properly.

B. Provide a written record of tests and results per Section 017800.

C. After operation and testing of systems, instruct Owner's representatives with Architect's representative present.

1.5 INSTRUCTIONS TO OWNER

A. Provide instructions before final payment is made. Submit evidence that instruction/maintenance manuals were delivered to and were acceptable to Owner.

B. Requirements herein supplement specific requirements provided under individual specification sections.

C. Collect information and data so complete manuals are provided in sufficient time to permit review prior to time for final payment. Refer also to Section 017800.

D. Provide qualified representatives of Contractor or subcontractors to give explanations and instructions.

E. Provide instruction manuals per Section 017800 to be used and reviewed during instructions.

F. Thoroughly and properly instruct the Owner in use, operation, care and maintenance of Project, especially various systems and equipment installed under Contract. Give instructions methodically and carefully. Cover various phases of work and in sufficient detail so Owner fully understands entire Project.

G. Orient and familiarize designated Owner Representatives with locations, methods, materials, uses and operation of systems and equipment, as well as specialized materials installed under Contract.

H. Instruct and demonstrate to the Owner regarding full use, sequence or function and similar information to fully acquaint Owner in proper use, care and control of equipment, systems and devices installed under Contract.

I. Precautionary Measures and Dangers of Misuse.
   1. Specifically explain precautions and dangers of misuse.
   2. Establish specific and agreed upon periods of time with the Owner, adequate to thoroughly present pertinent information.
   3. Owner will record length of time and number of days spent on these instructions.

J. Refer to Section 007300 (by CM) for additional information and data for maintenance manual such as coordination drawings.

K. Information Not Required:
   1. Normal and routine cleaning of normal floor and wall finishes.
   2. Maintenance of light fixtures.
   3. Cleaning of radiation covers.
   4. Hardware maintenance.
   5. Other similar housekeeping matters.

1.6 CLEAN-UP

A. Refer to General Conditions for cleaning requirements during construction.

B. Clean materials and equipment. Remove (haul away) debris, cartons, crates, surplus materials.

C. Maintain work neat and orderly.

D. Definitions
   1. Thorough Cleaning:
      a. Thorough cleaning required unless otherwise specified.
      b. Remove dust, dirt, debris, laitance, grease, oil, stains, discolorations, droppings, markings, and other soil or foreign matter or substance.
      c. Remove labels except labels specifically designated to remain as part of listed, rated or labeled item.
      d. Use appropriate methods such as sweeping, scrubbing, mopping, washing, dusting vacuuming so surface is completely clean and streak free.
   2. Broom Clean: Remove visible dirt or dust from surface with a new, high quality, clean broom by thoroughly and properly sweeping or brooming so no dust or dirt is visible on surface.

E. Perform general "final" cleaning prior to inspection for Substantial Completion and occupancy. Plan, organize and coordinate cleaning to avoid working in spaces once cleaned. Coordinate timely cleaning with Architect especially for cleaning of glass.

F. Clean entire Project including, but not limited to:
   1. Cleaning required under each Section.
   2. Remove accumulated dust, dirt and debris.
   3. Materials, equipment or other items.
   4. Glass - both sides, interior and exterior, and mirrors.
   5. Infection Control Area Clean Up:
      a. Vacuum clean above ceiling, pipes, and ventilation ducts after construction is completed.
      b. Check ventilation filters for breaks or leaks.
      c. Use damp mopping for dust control.
      d. Minimize traffic between construction area and patient control areas.
      e. Obtain Owner approval of cleaned area before proceeding.

G. Electrical Subcontractor Cleaning: Includes but is not limited to:
   1. Normally occupied areas, service areas, passages and corridors and similar spaces.
   2. Interiors of cabinets, panelboards and other equipment.
   3. Other work under contract needing cleaning.

H. Mechanical Subcontractor Cleaning: Includes but is not limited to:
   1. Remove filters used during construction and install permanent new filters.

2. Ductwork.
3. Fixtures and fittings.
4. Insides of convectors.
5. Unit heaters or similar units
6. Radiation.
7. Piping and equipment in equipment rooms
8. Other work under contract needing cleaning.

I. "Broom Clean" is allowed in following areas:
   1. Tunnels, shafts, air shafts and air plenums not constructed of ductwork
   2. Similar areas.
   3. Floors in equipment rooms (including rooms such as electrical equipment rooms)
      a. Except also wash floors and apply final coat of sealer if specified.

J. Floors (including concrete) must be free of stains and discoloration

K. Hardware: Adjust and polish as needed

L. Perform other cleaning as required to turn the Project over to the Owner in new, well maintained condition, ready for full use and occupancy.

M. Clean areas made dirty by work done after Substantial Completion so building is clean as specified prior to Final Completion.

1.7 FINAL ACCEPTANCE AND FINAL PAYMENT

A. Final payment will not be made until final acceptance inspection, completion of punch list items and final sign-off by Owner and Architect.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 017800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Closeout submittals.
   2. Warranties and guarantees.
   3. Test reports and certificates.
   4. Extra materials.
   5. Maintenance manuals.
   6. Record drawings and specifications.

B. Related Sections:
   1. Section 013300 - Submittal Procedures.
   2. Section 017700 - Closeout Procedures.

1.2 WARRANTIES AND GUARANTEES

A. Provide written guarantees specified in technical sections of Specifications.

B. Where guarantee terms are included in Specifications or a specific guarantee is referenced, submit guarantee in specified form.

C. Submit guarantees prior to final payment.

D. Submit a checklist of required guarantees, by section numbers.

1.3 TEST REPORTS AND CERTIFICATES

A. Provide test reports and certificates required in technical sections prior to final payment.

B. Provide a written record of systems and equipment testing and results.

C. Provide a check list of required reports and certificates, by Specifications sections.

1.4 EXTRA MATERIALS

A. Prior to final completion, deliver extra materials specified in various technical sections.

B. Do not allow materials to "collect" in various parts of Project. Deliver to Owner together.

C. Obtain receipt for specified extra materials. Without such evidence of delivery, no credit will be given for fulfilling specified requirements.

D. Provide a checklist of specified extra materials.

1.5 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

A. Coordinate submittals from Section 013300 that will be needed to fulfill following requirements.

B. Provide operating instruction data and maintenance manuals in accordance with Section 017700 - Closeout Procedures.

C. Organize information by classes or types of equipment and systems as follows:
   1. Manuals shall consist of neatly edited and typed instruction manuals (in hard cover, indexed, loose-leaf notebook) to explain use, function and control of equipment, materials and systems. Printed information shall include:
      a. Warranties and guarantees.
      b. Common errors made, which will "abuse" equipment or system
      c. Use, function and control of equipment and systems
      d. Clean installation data and pamphlets (not to be left at equipment but included in manuals)

e. Instructions and explanations.
f. Cleaning instructions.
g. Wiring and piping diagrams.
h. Various types of maintenance procedures.
i. Lubrication data and schedules.
j. Maintenance materials to be used.
k. Maintenance information.
l. Maintenance instructions with frequency.
m. Other maintenance information.
n. Adjustment and repair data.
o. Parts list with numbers and recommended parts for Owner's stock.
p. Names, addresses, and telephone numbers parts distributor.
q. Names, addresses, and telephone numbers of appropriate service organizations for various items and equipment.

2. Manuals shall include systems and equipment as specified, but not limited to following information:
   a. Heating plant
   b. Heating and ventilating equipment
   c. Fan units
   d. Air conditioning
   e. Controls for mechanical systems
   f. Alarm systems
   g. Electrical distribution systems
   h. Operating equipment of general construction
   i. Mechanical and electrical work
   j. Elevators
   k. Kitchen equipment
   l. Operable partitions
   m. Power operated doors
   n. Other similar systems and equipment.

1.6 RECORD SET OF DRAWINGS AND SPECIFICATIONS

A. Provide record set of Drawings and Specifications to Architect at completion of Contract.
   1. Refer to General Conditions for general requirements.
   2. Refer to Section 013300 - Submittal Procedures for posted (updated) job site contract documents.

B. During construction, maintain clean set of Drawings and Specifications for sole purpose of recording changes to Contract.

C. Mark record set methodically as work progresses, clearly and neatly, in color.

D. Include information cut and pasted into appropriate location of documents to reference change, adjustment, or clarification. Type of information to be recorded on record set includes but is not limited to:

1. Addendum items sent during bidding
2. Changes, deviations or revisions made, except minor or non-critical dimensions, including those made by Change Order or Supplementary Instructions.
3. Accepted submittals including shop drawings, product data and samples.
4. Omissions, including work omitted by accepted alternates.
5. Dimensioned locations of major or main utility lines, such as main conduit runs, piping mains and similar work.
6. Locations of control valves.
7. Additions to the work.
8. Changes in significant details.
9. Changed footing or other elevations.
10. Locations of electrical home run boxes, including circuit numbers and panel designations for each box.
11. Coordination drawings.
12. Changes in locations of panelboards, outlets, drains, piping, openings, dampers and similar features.
13. Other similar data.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 024113
SELECTIVE SITE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Protection of public properties/utilities and existing adjacent private structures/features
   2. Demolition of trees, other plant materials and surface features indicated
   3. Salvage
   4. Disposal of demolition material

1.2 RELATED SECTIONS

A. Related Sections:
   1. Section 017420 – Construction Waste Disposal and Recycling
   2. Section 320190 – Tree Preservation and Protection

B. Sustainable Design Intent: Comply with project requirements intended to achieve State of Minnesota B3 Benchmarking criteria.

1.3 DEFINITIONS

A. Tree: Deciduous or coniferous woody plant material.

B. Debris: Material such as trash, rubbish, concrete, bricks, fencing, culverts, windfalls, decaying matter, ash, etc., including materials generated from demolition of existing structures, surface materials, utilities and brush and tree removal.

C. Dripline: The area directly beneath the edges of a tree's canopy where a majority of its roots occur. One common method used to define a tree's protected root zone (PRZ).

D. Protected Root Zone (PRZ): The area in which construction damage should be avoided is called the PRZ. It is defined by its critical root radius which is calculated by measuring the tree's trunk diameter (dbh) 4.5-feet above the ground in inches. For each inch, allow 1-foot to 1.5-feet of critical root radius. For example, if a tree's dbh is ten inches, the critical root radius is 10-feet to 15-feet. Use the following chart for determining the PRZ:
   1. dbh x 1.5 = critical root radius

1.4 CONDITION AND ACCEPTANCE OF PREMISES

A. Accept premises as existing. Accept site features to be demolished upon execution of Contract with Owner. No damage or loss shall relieve Contractor from obligation to complete work under this Contract.

1.5 QUALITY ASSURANCE

A. Qualifications: Firm with not less than 5-years experiences in demolition similar in complexity to those required for this Project, including specific requirements indicated.
   1. Successfully completed not less than 5 comparable scale projects.

B. Regulatory Requirements: Refer to regulations for the municipality where project occurs.

C. Certifications: Perform work of this Section under the direct supervision of an International Society of Arboriculture Certified Arborist registered in the State of Minnesota.

D. Pre-demolition Conference: Contractor, Landscape Architect, Installer, Owner's Representative, and Representatives of other affected trades shall meet at the project site to review locations, removal procedure, acceptance of procedure, and coordination with other trades.
   1. Schedule meeting at least 1-week before start of removals.

1.6 PROTECTION AND SAFETY

A. Execute work in a manner to prevent injury or damage to public or private property. Prevent damage from falling trees or other cause.

B. Furnish barricades, covers and other temporary structures necessary for proper and safe conduct of work, or as required by law. Remove without additional compensation.

C. Protect trees to remain from damage. Limit compaction of roots on trees to remain.

D. Be responsible for complete safety of nearby buildings and assume liability for damage or similar injury resulting from operations or work under contract. If safety of nearby buildings or other work appears endangered, stop work and take corrective or preventative measures to eliminate possibilities of damage or injury. Conform to instructions from Municipality regarding safety, additional precautions, additional bracing or shoring and similar protective measures.

E. Provide warning lights and other lighting as required to permit safe pedestrian traffic.

F. Exercise prudent operation with heavy equipment to prevent damage when working adjacent to existing buildings or trees to remain. Govern operations accordingly.

G. Protect adjacent to property from damage due to demolition operations, including trucks and equipment. Repair damage to walks with equal or better materials by licensed concrete contractor.

1.7 PERMITS AND REGULATIONS

A. Review and comply with national, state and local standards and regulations including, but not limited to, pollution control standards.

B. Apply and pay for permits necessary to perform work.

PART 2 PRODUCTS

2.1 EQUIPMENT

A. Use appropriate equipment to obtain results expected, considering safety and expeditious methods and operations.

B. Use of explosives is not permitted.

PART 3 EXECUTION

3.1 EXISTING UTILITIES AND UNDERGROUND FEATURES

A. Contact municipal authorities and utility companies with jurisdiction in the area. Have utility companies verify and locate utility lines within the construction limits prior to initiating work.

3.2 DEMOLITION

A. Remove all trees – branches, leaves, limbs, trunks, roots and stumps in their entirety as shown on plans. If removals conflict with existing trees to remain review condition with Owner and Landscape Architect prior to removal.

B. Perform other incidental and collateral work necessary to fully complete removal of building or buildings as specified.

3.3 SALVAGE

A. Salvage desirable wood for use as directed by Owner.

B. Chip all limbs for use as wood chips. Stockpile in area as directed by Owner.

3.4 DISPOSAL OF DEMOLISHED MATERIALS

A. As it accumulates, remove from site debris, rubbish, and other materials resulting from demolition operations. Storage or sale of removed materials will not be permitted at site.

B. Stockpile brush removals on site as directed by Owner for burning.

C. Dispose of demolished materials off site at a permitted disposal facility, at no cost to Owner.

3.5 CONSTRUCTION WASTE MANAGEMENT

A. Comply with requirements of Section 017419 - Construction Waste Management for removal, recycling, and disposal of construction debris and waste.

END OF SECTION

SECTION 024119
SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Demolition and removal of selected portions of building or structure.
   2. Demolition and removal of site elements.
   3. Salvage of existing items to be reused or recycled.

B. Related Sections:
   1. Section 017420 – Construction Waste Disposal and Recycling
   2. Section 017329 – Cutting and Patching.

1.2 DEFINITIONS

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

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

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

D. 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.

1.3 SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate the following:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.
   3. Coordination for shutoff, capping, and continuation of utility services.
   4. Use of elevator and stairs.
   5. Locations of proposed dust- and noise-control temporary partitions and means of egress.
   6. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
   7. Means of protection for items to remain and items in path of waste removal from building.

B. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

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

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

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

E. Pre-Demolition Conference: Conduct conference at Project site to 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.

1.5 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
   1. Comply with requirements specified in Division 1 Section "Summary."

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

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

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

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

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

1.6 DEMOLITION SUMMARY

A. General Demolition:
   1. Many components of the building are historic. Preservation of historic materials is of high priority. All removal and installation of systems shall be coordinated with the Architectural drawings. Diligent effort is to be used when coordinating any removal or installation of systems. The contractor shall inform the Architect and Engineer of impact on any historical material that is not noted on the architectural drawings.
   2. Existing systems may be concealed within walls and vertical chases that are noted for demolition. The Contractor shall be responsible to identify the locations of all systems within walls or shafts and to protect those systems that serve occupied spaces in the building at the Terrace level and all upper floors. The Contractor shall inform the Architect and Engineer of impact to building systems serving occupied spaces.

B. Architectural Demolition:
   1. Select areas at the Terrace level will remain occupied during a portion or all of WP-1 including Senate Duplicating, Senate Media, The Rathskellar, the kitchen, Justice’s Dining, Governor’s Dining, and toilet rooms B24L and B24K. No demolition or construction is to occur in these spaces until they are vacated by the tenant. These rooms are marked on the Architectural Demolition floor plans. Partition type separating construction areas from occupied space should be reviewed with the Authority Having Jurisdiction and the owner.
   2. The Contractor shall maintain for tenant use a corridor system that connects the east, west, and north Campus tunnels at the Terrace level, as well as any exit path required by the AHJ for the Terrace level occupied spaces. The occupied corridor system may be temporarily relocated to facilitate demolition activities, but a tenant corridor system serving occupied Terrace level spaces shall be maintained throughout all phases of construction. Minimum dimensions and enclosure type of this corridor shall be reviewed with the Authority Having Jurisdiction and the owner.

C. HVAC Demolition:

1. The HVAC drawings show existing HVAC ductwork, piping and equipment/systems as can be viewed or as indicated on previous contract documents available. The Contractor shall field verify all existing conditions to determine the entire extent of existing HVAC systems ductwork, piping, controls, devices, and equipment. The Contractor shall leave all existing HVAC systems ductwork, piping, controls, devices, and equipment that are necessary to serve the occupied building areas during construction.
2. Where any ductwork, piping, controls, or equipment needs to be removed to accommodate a wall, floor, or ceiling removal, extend temporary ductwork, piping, or controls, to maintain HVAC systems operations for occupied spaces for the duration of construction. Make all required temporary connections necessary to ensure occupied spaces continuity of the systems throughout construction.

D. Plumbing Demolition:

1. The plumbing drawings show existing plumbing piping and equipment/systems as can be viewed or as indicated on previous contract documents available. This contractor shall field verify all existing conditions to determine the entire extent of existing plumbing piping and equipment. This contractor shall maintain existing plumbing systems/piping/heads that are necessary to serve the occupied building areas during construction.
2. The building will be occupied throughout construction. All demolition in the Terrace Level is to be coordinated with the Phased Construction of the levels above. Storm, Sanitary, Domestic Water and equipment serving the levels above must remain on-line and operational until the area it serves is demolished. Domestic water system (Cold, Hot, Recirculating), sanitary system, and rain water systems may be temporarily back fed with existing or new equipment.

E. Fire Protection:

1. The fire protection drawings show all existing fire protection systems as can be viewed or as indicated on previous contract documents available. The Contractor shall field verify all existing conditions to determine the entire extent of existing fire protection piping and equipment.
2. This contractor shall leave all existing fire protection systems/piping/heads that are necessary to serve all occupied building spaces at the Terrace level and the required Terrace level circulation corridors during all phases of work. Select areas at the terrace level will remain occupied and untouched during WP-1 – including Senate Duplicating, Senate Media, and the Rathskellar. WP-1 work shall provide temporary sprinkler protection at all times to serve a required occupied corridor system that connects the east and west tunnels at the Terrace Level, a corridor to the Rathskellar and any exit path required by the AHJ for Terrace level occupants. The occupied corridor system may temporarily be relocated to facilitate demolition activities but temporary protection using upright sprinklers shall be provided at all times at the temporary corridors.
3. Existing standpipe and/or riser feeds to all occupied upper levels shall remain active and be maintained.
4. Where any piping needs to be removed to accommodate a wall, floor, or ceiling removal, extend temporary piping to maintain fire protection water flow to all active heads required for fire protection coverage of occupied Terrace Level spaces that currently have fire protection coverage.
5. Where any piping needs to be removed to accommodate a wall, floor, or ceiling removal, extend temporary piping to maintain fire protection water flow to all active heads required for fire protection coverage of occupied spaces in the remainder of the building that currently have fire protection coverage.
6. The fire pump, controller and all valves/flow switches, etc. that are associated with protection of this floor and any other floors above shall remain active and fully functional during and after demolition. Make any temporary reconnections of piping, controls, wiring, panels, etc., as necessary to a permanent structure to remain after demolition.

1.7 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.

E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

   1. Comply with requirements for existing services/systems interruptions specified in Division 1 Section "Summary."

B. 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.
   2. Arrange to shut off indicated utilities with utility companies.
   3. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
   4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
      a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

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.

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

   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
   2. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   3. Cover and protect furniture, furnishings, and equipment that have not been removed.

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 structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
8. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
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.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts. Neatly trim openings to dimensions indicated.

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

C. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.

1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

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

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

B. Burning: Do not burn demolished materials.

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

3.7 CLEANING

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

END OF SECTION

SECTION 210500
COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This specification section covers the general scope of work required to enable the fire protection contractor to demolish existing work and provide continued fire protection of this level on a temporary basis and also to maintain continuity and operation of the existing fire protection systems serving all levels and areas of the State Capitol building during all phases of construction.

B. Work Package WP-1 Scope of work

1. The fire protection drawings show all existing fire protection systems as can be viewed or as indicated on previous contract documents available. This contractor shall field verify all existing conditions to determine the entire extent of existing fire protection piping and equipment. These drawings show demolition work that will be completed in total for all construction phases, not just for this WP-1 scope of work. This contractor shall leave all existing fire protection systems/piping/heads that are necessary to serve the occupied building areas during WP-1, removing only that which is necessary for WP-1 demolition.
2. This fire protection contractor shall remove sprinkler piping “only” where necessary as a result of a wall, floor or ceiling removal. All existing fire protection systems shall remain active during all demolition and construction.
3. Where any piping needs to be removed to accommodate a wall, floor, or ceiling removal, extend temporary piping to maintain fire protection water flow to all active heads required for full fire protection of the occupied areas of the Terrace Level and all floor levels above, for the full duration of all phases of construction.
4. The fire protection contractor shall provide upright heads for temporary fire protection in the occupied areas of the Terrace Level during all phases of construction. Remove any existing pendant or sidewall heads and replace with upright heads, layed out in a pattern to achieve code minimum protection throughout the occupied areas of the Terrace Level.
5. The fire pump, controller and all valves/flow switches, etc. that are associated with protection of this floor and any other floors above shall remain active and fully functional during and after demolition. Make any temporary reconnections of piping, controls, wiring, panels, etc., as necessary to a permanent structure to remain after demolition.
6. It is not intended by the contract drawings, that all work shown on the WP-1 drawings shown dashed be removed at this time.

C. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Grout.
3. Fire-suppression equipment and piping demolition.
4. Supports and anchorages.

1.3 QUALITY ASSURANCE

A. Comply with ASHRAE Guideline 4 – 2008 Preparation of operating and maintenance documentation for building systems.

B. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

C. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."

2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

D. Electrical Characteristics for Fire-Suppression Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.4 GUIDELINES, CODES AND STANDARDS

A. Refer to the most recently published edition for references to guidelines, and standards (examples: ASHRAE, NFPA, AWWA, ASTM) unless a specific edition is listed.

B. Installation and materials shall comply with applicable national, state, and local codes and ordinances.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

1.6 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for fire-suppression installations.

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 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 21 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 21 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
   a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
   b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

PART 3 EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 21 Sections specifying piping systems.

B. Install temporary piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping at code required slopes.

D. Install piping free of sags and bends.

E. Install fittings for changes in direction and branch connections.

F. Select system components with pressure rating equal to or greater than system operating pressure.

G. Verify final equipment locations for roughing-in.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 21 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

   1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.3 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.4 SEALANTS

A. Comply with Joint-sealant materials and applications specified in Section 078400 “Firestopping,” Section 078443 “Fire-resistant Joint Sealants,” Section 079000 “Joint Protection,” and Section 092900 “Gypsum Board: Acoustical sealants.”

END OF SECTION

SECTION 211313
WET-PIPE SPRINKLER SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This specification section covers the general scope of work required to enable the fire protection contractor to demolish existing work and provide continued fire protection of this level on a temporary basis and also to maintain continuity and operation of the existing fire protection systems serving all levels and areas of the State Capitol building during all phases of construction. This section contains materials and equipment that may be necessary to make temporary connections of the systems for continued operation of the fire protection serving the entire building Including the occupied areas of the Terrace Level as noted on drawings.

B. Section Includes:
   1. Pipes, fittings, and specialties.
   2. Sprinklers.

C. Protection Limits:
   1. Provide and maintain 100 percent coverage for all occupied areas of the Terrace Level.

1.3 DEFINITIONS

A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175 psig maximum.

1.4 SYSTEM DESCRIPTIONS

A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

1.5 PERFORMANCE REQUIREMENTS

A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
   1. Static and residual water pressure and water flow data shall be obtained from the local authority having jurisdiction.
   2. Minimum Pipe Sizes: Pipes shall not be smaller than sizes indicated on the drawings for connection to water supply piping, standpipes, and branches from standpipes to sprinklers.
   3. Maximum Water Velocity: Design water velocities shall not exceed 20 (FPS) feet per second in any fire protection piping.

B. Sprinkler system design shall be approved by authorities having jurisdiction.
   1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
   2. Sprinkler Occupancy Hazard Classifications:
      a. Building Service Areas: Ordinary Hazard, Group 1.
      b. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
      c. Machine Shops: Ordinary Hazard, Group 2.
      d. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.

   3. Minimum Density for Automatic-Sprinkler Piping Design:
      a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
      b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.

c. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. area.
d. Extra-Hazard, Group 1 Occupancy: 0.30 gpm over 2500-sq. ft. area.
e. Extra-Hazard, Group 2 Occupancy: 0.40 gpm over 2500-sq. ft. area.
f. Special Occupancy Hazard: As determined by authorities having jurisdiction.

4. Provide design area adjustments for sloped ceilings and dry systems as required by NFPA 13.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
   a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.

B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

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. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

1. NFPA 13, 2010 edition, "Installation of Sprinkler Systems."

1.7 PROJECT CONDITIONS

A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:

1. Notify Construction Manager, and Owner no fewer than two days in advance of proposed interruption of sprinkler service.
2. Do not proceed with interruption of sprinkler service without Construction Manager's, and Owner's written permission.

1.8 COORDINATION

A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

PART 2 PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

2.2 STEEL PIPE AND FITTINGS

A. Piping materials shall be equal to the existing piping systems that it is connected to.

B. Standard Weight, Galvanized and Black Steel Pipe: ASTM A 53/A 53M, Grade B. Pipe ends may be factory or field formed to match joining method.

C. Schedule 40, Galvanized-and Black-Steel Pipe: ASTM A 135; ASTM A 795/A 795M

D. Schedule 40, Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M.

E. Galvanized- and Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.

F. Galvanized and Uncoated, Steel Couplings: ASTM A 865, threaded.

G. Galvanized and Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

H. Cast-Iron Flanges: ASME 16.1, Class 125.

I. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

J. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.

K. Grooved-Joint, Steel-Pipe Appurtenances:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Anvil International, Incorporated.
      b. National Fittings, Incorporated.
      c. Shurjoint Piping Products.
      d. Tyco Fire & Building Products LP.
      e. Victaulic Company.
   2. Pressure Rating: 175 psig minimum.
   3. Galvanized and Uncoated, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
   4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick.
   1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
   2. Class 250, Cast-Iron Flanges and Class 300, Steel Raised-Face Flanges: Ring-type gaskets.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

D. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 SPRINKLERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Globe Fire Sprinkler Corporation.
   2. Reliable Automatic Sprinkler Company, Incorporated.
   3. Tyco Fire & Building Products LP.
   4. Victaulic Company.
   5. Viking Corporation.

B. General Requirements:
   1. Standard: UL's "Fire Protection Equipment Directory" listing" or "Approval Guide," published by FM Global, listing.
   2. Pressure Rating for Automatic Sprinklers: 175 psig minimum.

C. Automatic Sprinklers with Heat-Responsive Element:
   1. Nonresidential Applications: [**UL 199**].
   2. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Sprinkler Finishes:
   1. Chrome plated.
   2. Bronze.
   3. Painted.

2.5 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

PART 3 EXECUTION

3.1 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.

C. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

D. Install sprinkler piping with drains for complete system drainage.

E. Install hangers and supports for sprinkler system piping according to NFPA 13, Chapter 9. Comply with requirements for hanger materials in NFPA 13.

F. Fill sprinkler system piping with water.

3.2 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

C. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

D. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

E. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

G. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

H. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

I. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. Verify that equipment hose threads are same as local fire-department equipment.

C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.4 CLEANING

A. Clean dirt and debris from sprinklers.

B. Remove and replace sprinklers with paint other than factory finish.

3.5 PIPING SCHEDULE

A. Standard-pressure, wet-pipe sprinkler system, NPS 2 and smaller, shall be one of the following, to match existing materials being extended and connected to:
   1. Standard-weight or Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
   2. Standard-weight or Schedule 40, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
   3. Standard-weight or Schedule 40, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
   4. Standard-weight or Schedule 40, galvanized-steel pipe with roll-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
   5. Standard-weight or Schedule 40, black-steel pipe with plain ends; steel welding fittings; and welded joints.

B. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 to NPS 8, shall be one of the following, to match existing materials being extended and connected to:
   1. Standard-weight or Schedule 40, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
   2. Standard-weight or Schedule 40, galvanized-steel pipe with roll-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
   3. Standard-weight or Schedule 40, black-steel pipe with plain ends; steel welding fittings; and welded joints.

3.6 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:
   1. Rooms without Ceilings: Upright sprinklers.
   2. Wall Mounting: Sidewall sprinklers.
   3. Spaces Subject to Freezing: Upright, pendent, dry sprinklers; and sidewall, dry sprinklers as indicated.

B. Provide sprinkler types in subparagraphs below with finishes indicated.
   1. Concealed Sprinklers: Rough brass, with factory-painted cover plate. Cover plate cover shall be selected by architect.
   2. Upright, Pendent, and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION

SECTION 220500
COMMON WORK RESULTS FOR PLUMBING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This specification section covers the general scope of work required for the demolition of the existing plumbing piping, equipment, and systems work and to provide continued plumbing services for the Terrace level on a temporary basis and also to maintain continuity and operation of the existing plumbing systems serving all levels and areas of the State Capitol building during all phases of construction.

B. Work Package WP-1 Scope of work:

1. The plumbing drawings show all existing plumbing piping and equipment/systems as can be viewed or as indicated on previous contract documents available. This contractor shall field verify all existing conditions to determine the entire extent of existing plumbing piping and equipment. These drawings show demolition work that will be completed in total for all construction phases, not just for this WP-1 scope of work. This contractor shall leave all existing plumbing systems/piping/heads that are necessary to serve the occupied building areas during WP-1, removing only that which is necessary for WP-1 demolition.
2. This plumbing contractor shall remove plumbing piping, fixtures, and equipment “only” where necessary as a result of a wall, floor or ceiling removal. All existing plumbing piping and equipment/systems shall remain active during all demolition and construction.
3. Where any piping or equipment needs to be removed to accommodate a wall, floor, or ceiling removal, extend temporary piping to maintain plumbing systems operations for entire building for the full duration of all phases of construction. Make all required temporary piping connections necessary to ensure continuity of the plumbing systems throughout all phases of construction.
4. It is not intended by the contract drawings, that all work shown on the WP-1 drawings are to be removed at this time.
5. All existing plumbing fixtures, pipe, materials, equipment and appurtenances not included in the remodel or alteration areas are to remain in place.
6. Demolition will include removal of all fixtures from toilet rooms, showers, and all floor drains except in excluded areas indicated.
7. Domestic Water Supply
    a. Remove and dispose of the existing domestic water supply from west water meter assembly bypass to east water meter assembly.
    b. Remove elbow prior to east water meter assembly to provide bypass tee per City of St. Paul installation.
    c. Remove for replacement the 2-inch water piping, hangers, and valve which extends from the East Wing through the tunnel to the adjacent building.
    d. Remove and dispose of the two remote domestic-water chillers and corresponding piping, hangers, and circulating pumps serving the public water fountains.
    e. Remove and dispose of existing domestic water heat exchangers, pumps, storage tanks, piping, hangers, valves, expansion tanks, and other ancillary devices.
    f. Remove and dispose of the hot water recirculation piping, hangers, insulation, headers, valves, balancing valves, and circulators.
    g. Remove and dispose of domestic cold, hot, and recirculating water piping mains, branches, insulation, valves, fittings, and hangers.
8. Sanitary and Vent System
    a. The existing sanitary waste and vent system will be demolished in all areas except excluded areas and as noted.
    b. Remove and dispose of the 12-inch sanitary sewer from the south building wall to the extent of the branches.

c. Remove and dispose of the 5-inch sanitary sewer from the west building wall to the extent of the branches.
d. Remove and dispose of the 8-inch sanitary sewer from the south building wall to the extent of the branches.
e. Remove and dispose of the sanitary sumps and ejectors located throughout the Terrace Level.
f. Remove and dispose of the sanitary waste and sanitary vent system including any sanitary vents older than 25 years serving the kitchen and associated restrooms but located above and outside the excluded boundaries.

9. Storm Sewer System
   a. Remove and dispose of the 10-inch storm sewer from the south building wall to the extent of the branches.
   b. Remove and dispose of the 8-inch storm sewers above and below Terrace floor from the building wall to the extent of the branches. There are 4 locations of 8-inch storm sewer – northeast on West Wing, southeast on West Wing, northwest on East Wing, and south on East Wing.
   c. Remove and dispose of the storm sumps and ejectors located throughout the Terrace Level except as noted.
   d. Remove and dispose of the plaza drain leaders above and below Terrace Level floor.
   e. Remove and dispose of all roof drain leaders except the new dome drain leader from the dome scuppers. Remove and dispose of the original dome drain leader from new leader connection downward.
   f. Remove and dispose of the Quadriga corner roof drains and rain leaders. The Quadriga corner roof drains are located at the base element of the Quadriga statuary
   g. Remove and dispose of the Quadriga promenade drains and leaders.

C. This Section includes the following:
   1. Piping materials and installation instructions common to most piping systems.
   2. Transition fittings.
   3. Dielectric fittings.
   4. Plumbing demolition.
   5. Supports and anchorages.

1.3 QUALITY ASSURANCE

A. Comply with ASHRAE Guideline 4 – 2008 Preparation of operating and maintenance documentation for building systems.

B. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

C. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
   1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
   2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

D. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.5 COORDINATION

A. Many components of the building are historic. Preservation of historic materials is of high priority. All removal and installation of systems shall be coordinated with the Architectural drawings. Diligent effort is to be used when coordinating any removal or installation of systems. If any portion of the building and impact of construction is questionable, the contractor shall inform the Architect and Engineer of the issue as well as any proposed solutions.

B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.

C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

D. Coordinate plumbing equipment installation with other building components.

E. Sequence, coordinate, and integrate installations of plumbing materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning prior to closing in the building.

1.6 GUIDELINES, CODES AND STANDARDS

A. Refer to the most recently published edition for references to guidelines, and standards (examples: ASHRAE, NFPA, AWWA, ASTM) unless a specific edition is listed.

B. Installation and materials shall comply with applicable national, state, and local codes and ordinances.

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 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
   a. Full-Face Type: For flat-face, Class 125, cast-bronze flanges.
   b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
   1. Manufacturers:
      a. Cascade Waterworks Mfg. Company
      b. Dresser Industries, Incorporated; DMD Division
      c. Ford Meter Box Company, Incorporated (The); Pipe Products Division
      d. JCM Industries.
      e. Smith-Blair, Incorporated
      f. Viking Johnson.
   2. Underground Piping NPS 1-1/2 and Smaller: Manufactured fitting or coupling.
   3. Underground Piping NPS 2 and Larger: AWWA C219, metal sleeve-type coupling.
   4. Aboveground Pressure Piping: Pipe fitting.

B. Flexible Transition Couplings for Underground Non-pressure Drainage Piping: ASTM C 1173 with elastomeric sleeve ends same size as piping to be joined, and corrosion-resistant metal band on each end.
   1. Manufacturers:
      a. Cascade Waterworks Mfg. Company.
      b. Fernco, Incorporated.
      c. Mission Rubber Company.
      d. Plastic Oddities, Incorporated.

2.5 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
   1. Manufacturers:
      a. Capitol Manufacturing Company
      b. Central Plastics Company.
      c. Epco Sales, Incorporated
      d. Watts Industries, Incorporated; Water Products Division

D. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
   1. Manufacturers:
      a. Advance Products & Systems, Incorporated
      b. Calpico, Incorporated
      c. Central Plastics Company.
      d. Pipeline Seal and Insulator, Incorporated
   2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.

E. Dielectric Couplings: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
   1. Manufacturers:
      a. Elster Perfection Corporation.

      Contractor may offer and propose an alternative manufacturer for consideration by the Owner. Contractor shall identify both the base manufacturer and the proposed alternative manufacturer in the bid form for Owner consideration.

F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.
   1. Manufacturers:
      a. Elster Perfection Corporation.

         Contractor may offer and propose an alternative manufacturer for consideration by the Owner. Contractor shall identify both the base manufacturer and the proposed alternative manufacturer in the bid form for Owner consideration.

PART 3 EXECUTION

3.1 PLUMBING DEMOLITION

A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.
   1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
   2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material. If underfloor pipe, fill with gravel and cap with same or compatible piping material.
   3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
   4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
   5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install temporary piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Install temporary piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

C. Install temporary piping above accessible ceilings to allow sufficient space for ceiling panel removal.

D. Install temporary piping to permit valve servicing.

E. Install piping at code required slopes.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Install temporary piping to allow application of insulation.

I. Select system components with pressure rating equal to or greater than system operating pressure.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

J. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

   1. Install unions, in steel piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
   2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
   3. Wet Piping Systems: Install dielectric nipple fittings to connect piping materials of dissimilar metals.

END OF SECTION

SECTION 220523
GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This specification section covers the general scope of work required for the demolition of the existing plumbing piping, equipment and systems and to provide continued plumbing services for remaining plumbing systems on this Terrace level on a temporary basis and also to maintain continuity and operation of the existing plumbing piping and equipment systems serving all levels and areas of the State Capitol building during all phases of construction. This section contains materials and equipment that may be necessary to make temporary connections of the systems for continued operation of the plumbing systems serving entire building.

B. Section Includes:

1. Bronze ball valves.
2. Iron, single-flange butterfly valves.
3. Iron, grooved-end butterfly valves.
4. Bronze lift-check valves.
5. Bronze swing-check valves.
6. Iron swing check valves.
7. Iron swing check valves with closure control.
8. Iron, center-guided check valves.
9. Iron, plate-type check valves.
10. Bronze globe valves.
11. Iron globe valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Non-rising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Bronze Valves: NPS 3 and smaller with threaded ends, unless otherwise indicated.

E. Ferrous Valves: NPS 4 and larger with flanged ends, unless otherwise indicated.

F. Valve Actuator Types:
   1. Gear Actuator: For quarter-turn valves NPS 8 and larger.
   2. Handwheel: For valves other than quarter-turn types.
   3. Hand-lever: For quarter-turn valves NPS 6 and smaller.

G. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
   1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
   2. Butterfly Valves: With extended neck.

H. Valve-End Connections:
   1. Flanged: With flanges according to ASME B16.1 for iron valves.
   2. Grooved: With grooves according to AWWA C606.
   3. Solder Joint: With sockets according to ASME B16.18.
   4. Threaded: With threads according to ASME B1.20.1.
   5. Mechanical Joint: Mechanical connection ASTM B88 for Type L hard drawn tubing.

I. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES

A. Two-Piece, Standard-Port, Bronze Ball Valves with Bronze Trim:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Conbraco Industries, Incorporated; Apollo Valves. (www.apollovalves.com) (Example 70-100-03-X)
         Contractor may offer and propose an alternative manufacturer for consideration by the Owner. Contractor shall identify both the base manufacturer and the proposed alternative manufacturer in the bid form for Owner consideration.
   2. Description:
      a. Standard: MSS SP-110.
      b. SWP Rating: 150 psig.
      c. CWP Rating: 600 psig.
      d. Body Design: Two piece.
      e. Body Material: Bronze.
      f. Ends: Threaded.
      g. Seats: PTFE or TFE.
      h. Stem: Bronze.
      i. Stem Extension: 1.25-inches
      j. Ball: Chrome-plated brass.
      k. Port: Standard.

2.3 IRON, SINGLE-FLANGE BUTTERFLY VALVES

A. 200 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Aluminum-Bronze Disc:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABZ Valve and Controls; a division of ABZ Manufacturing, Incorporated (www.abzvalve.com)
b. Conbraco Industries, Incorporated; Apollo Valves. (www.apollovalves.com) (Example 143 Series)
c. Crane Company; Crane Valve Group; Stockham Division. (www.stockham.com).
d. DeZurik Water Controls. (www.dezurik.com)
e. Hammond Valve. (www.hammondvalve.com) (Example #6211-XX)
f. Kitz Corporation. (www.kitz.com)
g. Milwaukee Valve Company. (www.milwaukeevalve.com) (Example #CL223E)
h. NIBCO Incorporated. (www.nibco.com). (Example LD2000-3)
i. Spence Strainers International; a division of CIRCOR International, Incorporated (Example BF Series)
j. Watts Regulator Company; a division of Watts Water Technologies, Incorporated (www.watts.com) (Example DBF-03)

2. Description:
   a. Standard: MSS SP-67, Type I.
   b. CWP Rating: 200 psig.
   c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
   d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
   e. Seat: EPDM.
   f. Stem: One- or two-piece stainless steel.
   g. Disc: Aluminum bronze.

2.4 IRON, GROOVED-END BUTTERFLY VALVES

A. 175 CWP, Iron, Grooved-End Butterfly Valves:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Victaulic Company. (Example Series 761)
   2. Description:
      a. Standard: MSS SP-67, Type I.
      b. CWP Rating: 175 psig.
      c. Body Material: Coated, ductile iron.
      d. Stem: Two-piece stainless steel.
      e. Disc: Coated, ductile iron.
      f. Seal: EPDM.

2.5 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Crane Company; Crane Valve Group; Stockham Division. (www.stockham.com). (Example B-319Y)
      b. Hammond Valve. (www.hammondvalve.com) (Example IB940)
      c. Milwaukee Valve Company. (www.milwaukeevalve.com) (Example 509)
      d. NIBCO Incorporated. (www.nibco.com). (Example T413Y)
   2. Description:
      a. Standard: MSS SP-80, Type 3.
      b. CWP Rating: 200 psig.
      c. Body Design: Horizontal flow.
      d. Body Material: ASTM B 62, bronze.
      e. Ends: Threaded.
      f. Disc: Bronze.

2.6 IRON SWING CHECK VALVES

A. Class 125, Iron Swing Check Valves with Metal Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Crane Company; Crane Valve Group; Stockham Division. (www.stockham.com). (Example G-931)
   b. Hammond Valve. (www.hammondvalve.com) (Example IR1124)
   c. Milwaukee Valve Company. (www.milwaukeevalve.com) (Example F2974A)
   d. NIBCO Incorporated. (www.nibco.com) (Example F918-B)
   e. Powell Valves. (www.powellvalves.com) (Example 559)
2. Description:
   a. Standard: MSS SP-71, Type I.
   b. CWP Rating: 200 psig.
   c. Body Design: Clear or full waterway.
   d. Body Material: ASTM A 126, gray iron with bolted bonnet.
   e. Ends: Flanged.
   f. Trim: Bronze.
   g. Gasket: Asbestos free.

2.7 IRON SWING CHECK VALVES WITH CLOSURE CONTROL

A. Class 125, Iron Swing Check Valves with Lever- and Spring-Closure Control:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. NIBCO Incorporated. (www.nibco.com)
   2. Description:
      a. Standard: MSS SP-71, Type I.
      b. CWP Rating: 200 psig.
      c. Body Design: Clear or full waterway.
      d. Body Material: ASTM A 126, gray iron with bolted bonnet.
      e. Ends: Flanged.
      f. Trim: Bronze.
      g. Gasket: Asbestos free.
      h. Closure Control: Factory-installed, exterior lever and spring.

2.8 IRON, GROOVED-END SWING CHECK VALVES

A. 300 CWP, Iron, Grooved-End Swing Check Valves:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Victaulic Company. (www.victaulic.com) (Example 712)
   2. Description:
      a. CWP Rating: 300 psig.
      b. Body Material: ASTM A 536, ductile iron.
      c. Seal: EPDM.
      d. Disc: Spring-operated, ductile iron or stainless steel.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install check valves for proper direction of flow and as follows:
   1. Swing Check Valves: In horizontal position with hinge pin level.
   2. Center-Guided and Plate-Type Check Valves: In horizontal or vertical position, between flanges.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:
   1. Shutoff Service: NPS 3 and smaller - ball valves.
   2. Shutoff Service: NPS 4 and larger - butterfly valves.
   3. Butterfly Valve Dead-End Service: Single-flange (lug) type.
   4. Throttling Service: NPS 3 and smaller - ball valves.
   5. Throttling Service: NPS 4 and larger - globe valves.
   6. Pump-Discharge Check Valves:
      a. NPS 3 and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
      b. NPS 4 and Larger for Domestic Water: Iron swing check valves with lever and weight or with spring or iron, center-guided, metal or resilient-seat check valves.
      c. NPS 2 and Larger for Sanitary Waste and Storm Drainage: Iron swing check valves with lever and weight or spring.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:
   1. For Copper Tubing, NPS 3 and Smaller: Threaded ends.
   2. For Steel Piping, NPS 4 and Larger: Flanged ends.

3.5 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 3 and Smaller:
   1. Ball Valves: Two piece, full port, bronze with bronze or stainless-steel trim.
   2. Bronze Swing Check Valves: Class 125, bronze disc.

B. Pipe NPS 4 and Larger:
   1. Iron Valves, NPS 4: May be provided with threaded ends instead of flanged ends.
   2. Iron, Single-Flange Butterfly Valves: 200 CWP, EPDM seat, aluminum-bronze, ductile-iron or stainless-steel disc.
   3. Iron Swing Check Valves: Class 125, nonmetallic-to-metal seats.
   4. Iron Swing Check Valves with Closure Control: Class 125, lever and weight.
   5. Iron, Grooved-End Swing Check Valves: 300 CWP.
   6. Iron Globe Valves: Class 125.

END OF SECTION

SECTION 220529
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This specification section covers the general scope of work required for the demolition of the existing plumbing piping, equipment and systems and to provide continued plumbing services for remaining plumbing systems on this Terrace level on a temporary basis and also to maintain continuity and operation of the existing plumbing piping and equipment systems serving all levels and areas of the State Capitol building during all phases of construction. This section contains materials and equipment that may be necessary to make temporary connections of the systems for continued operation of the plumbing systems serving entire building.

B. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Fiberglass pipe hangers.
4. Metal framing systems.
5. Fiberglass strut systems.
6. Thermal-hanger shield inserts.
7. Fastener systems.
8. Pipe stands.
9. Pipe positioning systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Fiberglass strut systems.
4. Pipe stands.
5. Equipment supports.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.

2. Galvanized Metallic Coatings: Pre-galvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:
1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of **copper-coated steel**.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, stainless-steel anchors, for use in hardened Portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.4 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.5 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink and non-metallic grout; suitable for interior and exterior applications.
1. Properties: Non-staining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

H. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Install lateral bracing with pipe hangers and supports to prevent swaying.

J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

K. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

M. Insulated Piping:
1. Attach clamps and spacers to piping.
   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
4. Shield Dimensions for Pipe: Not less than the following:
   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
   e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and 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. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and attachments for general service applications.

F. Use stainless-steel pipe hangers and fiberglass pipe hangers and attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal-hanger shield inserts for insulated piping and tubing.

J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated, stationary pipes NPS 1/2 to NPS 30.
   2. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of non-insulated, stationary pipes NPS 1/2 to NPS 8.
   3. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of non-insulated, stationary pipes NPS 3/8 to NPS 3.
   4. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
   5. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
   6. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
   7. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
   8. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.

9. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.
13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

O. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

P. Use powder-actuated fasteners instead of building attachments where required in concrete construction.

Q. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION

SECTION 220719
PLUMBING PIPING INSULATION

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 specification section covers the general scope of work required for the demolition of the existing plumbing piping, equipment and systems and to provide continued plumbing services for remaining plumbing systems on this Terrace level on a temporary basis and also to maintain continuity and operation of the existing plumbing piping and equipment systems serving all levels and areas of the State Capitol building during all phases of construction. This section contains materials and equipment that may be necessary to make temporary connections of the systems for continued operation of the plumbing systems serving entire building.

B. Section includes insulating the following plumbing piping services:
   1. Domestic cold-water piping.
   2. Domestic hot-water piping.
   3. Domestic recirculating hot-water piping.
   4. Rainwater leaders.

C. Related Sections:
   1. Section 220716 "Plumbing Equipment Insulation."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
   1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
   2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

B. Comply with the following applicable standards and other requirements specified for miscellaneous components:
   1. Supply and Drain Protective Shielding Guards: ICC A117.1.

PART 2 PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Mineral-Fiber, Preformed Pipe Insulation:
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Fibrex Insulations Inc.; Coreplus 1200.
      b. Johns Manville; Micro-Lok.
      c. Knauf Insulation; 1000-Degree Pipe Insulation.
      d. Manson Insulation Inc.; Alley-K.
      e. Owens Corning; Fiberglas Pipe Insulation.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Ramco Insulation, Inc.; Super-Stik.

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Ramco Insulation, Inc.; Thermokote V.

C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Ramco Insulation, Inc.; Ramcote 1200 and Quik-Cote.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
      b. Eagle Bridges - Marathon Industries; 225.
      c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
      d. Mon-Eco Industries, Inc.; 22-25.

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
   1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
      b. Vimasco Corporation; 749.
   2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
   3. Service Temperature Range: Minus 20 to plus 180 deg F.
   4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
   5. Color: White.

2.5 SEALANTS

A. Joint Sealants:
   1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
b. Eagle Bridges - Marathon Industries; 405.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45.
d. Mon-Eco Industries, Inc.; 44-05.
e. Pittsburgh Corning Corporation; Pittseal 444.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Permanently flexible, elastomeric sealant.
4. Service Temperature Range: Minus 100 to plus 300 deg F.
5. Color: White or gray.

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.7 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Johns Manville; Zeston.
   b. P.I.C. Plastics, Inc.; FG Series.
   c. Proto Corporation; LoSmoke.
   d. Speedline Corporation; SmokeSafe.
2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
   a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.8 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. ABI, Ideal Tape Division; 428 AWF ASJ.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
   c. Compac Corporation; 104 and 105.
   d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

2.9 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers>:

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Engineered Brass Company.
   b. Insul-Tect Products Co.; a subsidiary of MVG Molded Products.

c. McGuire Manufacturing.
d. Plumberex.
e. Truebro; a brand of IPS Corporation.
f. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.

2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures:

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Truebro; a brand of IPS Corporation.
   b. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.
2. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

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

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
   a. For below-ambient services, apply vapor-barrier mastic over staples.
4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:
1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

C. Insulation Installation at Floor Penetrations:
1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.

2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.

2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.7 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.8 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:
1. NPS 2 and Smaller: Insulation shall be the following:
   a. Mineral-Fiber Pipe Insulation, Type I: 1/2 inch thick.
2. NPS 2-1/2 and Larger: Insulation shall be the following:
   a. Mineral-Fiber Pipe Insulation, Type I: 1 inch thick.

B. Domestic Hot and Recirculated Hot Water:
1. NPS 1-1/4 and Smaller: Insulation shall be the following:
   a. Mineral-Fiber Pipe Insulation, Type I: 1/2 inch thick.
2. NPS 1-1/2 and Larger: Insulation shall be the following:
   a. Mineral-Fiber Pipe Insulation, Type I: 1 inch thick.

C. Storm-water and Overflow:
1. Insulate down comers from roof drain bodies, horizontal piping to the connection at main vertical piping, and 5 feet down the vertical piping from the connection. Insulate down comers from overflow roof drain bodies and piping within 5 feet of the overflow roof drains.
2. Insulate all exposed overflow storm water piping.
3. All Pipe Sizes: Insulation shall be the following:
   a. Mineral-Fiber Pipe Insulation, Type I: 1 inch thick.

3.9 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Exposed:

1. Piping located within 8 feet of the floor; less than 200 degrees F: PVC: 30 mils thick.

END OF SECTION

SECTION 221116
DOMESTIC WATER PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This specification section covers the general scope of work required for the demolition of the existing plumbing piping, equipment and systems and to provide continued plumbing services for remaining plumbing systems on this Terrace level on a temporary basis and also to maintain continuity and operation of the existing plumbing piping and equipment systems serving all levels and areas of the State Capitol building during all phases of construction. This section contains materials and equipment that may be necessary to make temporary connections of the systems for continued operation of the plumbing systems serving entire building.

PART 2 PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.

C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

2.3 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Nipples:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Elster Perfection Corporation.
         Contractor may offer and propose an alternative manufacturer for consideration by the Owner. Contractor shall identify both the base manufacturer and the proposed alternative manufacturer in the bid form for Owner consideration.
   2. Standard: IAPMO PS 66.
   3. Electroplated steel nipple complying with ASTM F 1545.
   4. Pressure Rating and Temperature: 300 psig at 225 deg F.
   5. End Connections: Male threaded or grooved.
   6. Lining: Inert and noncorrosive, propylene.

PART 3 EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance.

C. Install shutoff valve immediately upstream of each dielectric fitting.

D. Install domestic water piping level with 0.25 percent slope downward toward drain.

E. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

F. Install piping to permit valve servicing.

G. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install sleeves for piping penetrations of walls, ceilings, and floors.

K. Install sleeve seals for piping penetrations of concrete walls and slabs.

3.2 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

D. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.3 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings.

3.4 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 3 and Smaller: Use dielectric couplings or nipples.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:
   a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.

c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support vertical piping and tubing at base and at each floor.

C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
4. NPS 2-1/2: 108 inches with 1/2-inch rod.
5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.

E. Install hangers for stainless-steel piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.
2. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.

F. Install supports for vertical stainless-steel piping every 15 feet.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
1. Piping Inspections:
a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
c. Re-inspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for re-inspection.
d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
2. Piping Tests:
a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.8 ADJUSTING

A. Perform the following adjustments before operation:
1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
   a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
   b. Adjust calibrated balancing valves to flows indicated.
5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.9 CLEANING

A. Clean and disinfect potable domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
   a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
   b. Fill and isolate system according to either of the following:
      1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
      2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
   c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
   d. Repeat procedures if biological examination shows contamination.
   e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Clean non-potable domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:
   a. Flush piping system with clean, potable water until dirty water does not appear at outlets.

b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.10 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints NPS 4 and larger, unless otherwise indicated.

C. Fitting Option: Brazed joints may be used on aboveground copper tubing.

D. Aboveground domestic water piping shall be :

1. Hard copper tube, ASTM B 88, Type L; cast-or wrought-copper solder-joint fittings; and soldered joints.

3.11 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use 2-piece full port ball valves for piping NPS 4 and smaller. Use butterfly, with flanged ends for piping larger than NPS 4.
2. Throttling Duty: Use 2-piece full port ball valves for piping NPS 4 and smaller. Use butterfly valves with flanged ends for piping larger than NPS 4.
3. Hot-Water Circulation Piping, Balancing Duty: Calibrated, Memory-stop balancing valves.
4. Drain Duty: Hose-end ball valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION

SECTION 221316
SANITARY WASTE AND VENT PIPING

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 specification section covers the general scope of work required for the demolition of the existing plumbing piping, equipment and systems and to provide continued plumbing services for remaining plumbing systems on this Terrace level on a temporary basis and also to maintain continuity and operation of the existing plumbing piping and equipment systems serving all levels and areas of the State Capitol building during all phases of construction. This section contains materials and equipment that may be necessary to make temporary connections of the systems for continued operation of the plumbing systems serving entire building.

B. Section Includes:

1. Pipe, tube, and fittings.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

1.4 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

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. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. AB&I Foundry
   b. Charlotte Pipe and Foundry
   c. Tyler Pipe; Soil Pipe Division

B. Standard Hubless-Piping Couplings:

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

a. ANACO-Husky.
b. Dallas Specialty & Manufacturing Company
c. Fernco Incorporated
d. Matco-Norca, Incorporated
e. MIFAB, Incorporated
f. Mission Rubber Company; a division of MCP Industries, Incorporated
g. Stant.
h. Tyler Pipe.

2. Standards: ASTM C 1277; CISPI Designation 310-09, NSF Certified.
3. Description: 301 stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, Neoprene sleeve with integral, center pipe stop.
4. Bands:
   a. NPS 4 inches and less: 2 bands, 60 inch pounds torque.
   b. NPS 5 to NPS 10: 4 bands, 60 inch pounds torque.

2.4 SPECIALTY PIPE FITTINGS

A. Transition Couplings:
   1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
   2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
   3. Unshielded, Non-pressure Transition Couplings:
      a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         1) Dallas Specialty & Manufacturing Company
         2) Fernco Incorporated
         3) Mission Rubber Company; a division of MCP Industries, Incorporated
         4) Plastic Oddities; a division of Diverse Corporate Technologies, Incorporated
      b. Standard: ASTM C 1173, NSF Certified.
      c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
      d. Sleeve Materials:
         1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
         2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
         3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
   4. Shielded, Non-pressure Transition Couplings:
      a. Manufacturers: Subject to compliance with requirements, [provide products by one of the following:
         1) Cascade Waterworks Manufacturing Company
         2) Mission Rubber Company; a division of MCP Industries, Incorporated
      b. Standard: ASTM C 1460, NSF Certified.
      c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Division 31 Section "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Sanitary sewer piping more than 5-feet outside the building is specified in Division 33 Section "Sanitary Sewerage."

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

M. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

3.3 PLUMBING SPECIALTIES

A. Install backwater valves in sanitary waste gravity-flow piping. Comply with requirements for backwater valves specified in Division 22 Section "Sanitary Waste Piping Specialties."

B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping. Comply with requirements for cleanouts specified in Division 22 Section "Sanitary Waste Piping Specialties."

C. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Division 22 Section "Sanitary Waste Piping Specialties."

D. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

E. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

F. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

G. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

3.4 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.5 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:
   1. Install transition couplings at joints of piping with small differences in OD's.
   2. In Drainage Piping: Shielded, non-pressure transition couplings.
   3. In Aboveground Force Main Piping: Fitting-type transition couplings.
   4. In Underground Force Main Piping:
      a. NPS 1-1/2 and Smaller: Fitting-type transition couplings.
      b. NPS 2 and Larger: Pressure transition couplings.

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger and support devices and installation specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
   1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
   2. Install fiberglass pipe hangers for horizontal piping in corrosive environments.
   3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
   4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
   5. Vertical Piping: MSS Type 8 or Type 42, clamps.
   6. Install individual, straight, horizontal piping runs:
      a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
      b. Longer than 100 Feet: MSS Type 43, adjustable roller hangers.
      c. Longer than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
   7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
   8. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support horizontal piping and tubing within 18 inches of each fitting and coupling.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
   2. NPS 3: 60 inches with 1/2-inch rod.
   3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
   4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
   5. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

F. Install supports for vertical cast-iron soil piping every 15 feet.

G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1-1/4: 84 inches with 3/8-inch rod.

2. NPS 1-1/2: 108 inches with 3/8-inch rod.
3. NPS 2: 10 feet with 3/8-inch rod.
4. NPS 2-1/2: 11 feet with 1/2-inch rod.
5. NPS 3: 12 feet with 1/2-inch rod.
6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
7. NPS 6 and NPS 8: 12 feet with 3/4-inch rod.
8. NPS 10 and NPS 12: 12 feet with 7/8-inch rod.

H. Install supports for vertical steel piping every 15 feet.

I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

J. Bracing: Horizontal cast-iron pipe and fittings NPS 5 and larger shall be braced to prevent horizontal movement. Bracing shall be located at each branch connection and each change of direction.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:
1. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
2. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
3. Comply with requirements for backwater valves, cleanouts, and drains specified in Division 22 Section "Sanitary Waste Piping Specialties."

3.8 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.9 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.10 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.11 PIPING SCHEDULE

A. Aboveground, soil and waste piping NPS 1.5 and smaller shall be the following:
   1. Hubless, cast-iron soil pipe and fittings; standard hubless-piping couplings; and coupled joints.

B. Aboveground, soil and waste piping NPS 2 to NPS 10 shall be the following:
   1. Hubless, cast-iron soil pipe and fittings; standard hubless-piping couplings; and coupled joints.

C. Aboveground, vent piping NPS 1.5 and smaller shall be the following:
   1. Hubless, cast-iron soil pipe and fittings; standard hubless-piping couplings; and coupled joints.

D. Aboveground, vent piping NPS 2 to NPS 10 shall be the following:
   1. Hubless, cast-iron soil pipe and fittings; standard hubless-piping couplings; and coupled joints.

E. Underground, soil, waste, and vent piping NPS 12 and smaller shall be the following:
   1. Hubless, cast-iron soil pipe and fittings; **cast-iron** hubless-piping couplings; and coupled joints.

END OF SECTION

SECTION 221413
FACILITY STORM DRAINAGE PIPING

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 specification section covers the general scope of work required for the demolition of the existing plumbing piping, equipment and systems and to provide continued plumbing services for remaining plumbing systems on this Terrace level on a temporary basis and also to maintain continuity and operation of the existing plumbing piping and equipment systems serving all levels and areas of the State Capitol building during all phases of construction. This section contains materials and equipment that may be necessary to make temporary connections of the systems for continued operation of the plumbing systems serving entire building.

B. Section Includes:
   1. Pipe, tube, and fittings.
   2. Specialty pipe fittings.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
   1. Storm Drainage Piping: 10-foot head of water.

1.4 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

1.5 PROJECT CONDITIONS

A. Interruption of Existing Storm-Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
   1. Notify Architect, Construction Manager, and Owner no fewer than two days in advance of proposed interruption of storm-drainage service.
   2. Do not proceed with interruption of storm-drainage service without Owner's written permission.

PART 2 PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. AB&I Foundry
      b. Charlotte Pipe and Foundry
      c. Tyler Pipe; Soil Pipe Division

B. CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ANACO-Husky.
   b. Dallas Specialty & Mfg. Co.
   c. Fernco Inc.
   d. Matco-Norca, Inc.
   e. MIFAB, Inc.
   f. Mission Rubber Company; a division of MCP Industries, Inc.
   g. Stant.
2. Standards: ASTM C 1277 and CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

C. Heavy-Duty, Hubless-Piping Couplings:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ANACO-Husky.
   b. Clamp-All Corp.
   c. Dallas Specialty & Mfg. Co.
   d. MIFAB, Inc.
   e. Mission Rubber Company; a division of MCP Industries, Inc.
   f. Stant.
   g. Tyler Pipe.
2. Standards: ASTM C 1277 and ASTM C 1540.
3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

D. Cast-Iron, Hubless-Piping Couplings:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. MG Piping Products Company.
2. Standard: ASTM C 1277.
3. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.3 SPECIALTY PIPE FITTINGS

A. Transition Couplings:
1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified-piping-system fitting.
3. Unshielded, Non-pressure Transition Couplings:
4. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1) Dallas Specialty & Mfg. Co.
   2) Fernco Inc.
   3) Mission Rubber Company; a division of MCP Industries, Inc.
   4) Plastic Oddities; a division of Diverse Corporate Technologies, Inc.
   b. Standard: ASTM C 1173.
   c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
   d. Sleeve Materials:
      1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
      2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
      3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
5. Shielded, Non-pressure Transition Couplings:

6. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    1) Cascade Waterworks Mfg. Co.
    2) Mission Rubber Company; a division of MCP Industries, Inc.
    b. Standard: ASTM C 1460.
    c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
7. Pressure Transition Couplings:
8. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    1) Cascade Waterworks Mfg. Co.
    2) Dresser, Inc.
    3) EBAA Iron, Inc.
    4) Ford Meter Box Company, Inc. (The)
    5) JCM Industries, Inc.
    6) Romac Industries, Inc.
    7) Smith-Blair, Inc.; a Sensus company.
    8) Viking Johnson; c/o Mueller Co.
    b. Standard: AWWA C219.
    c. Description: Metal, sleeve-type couplings same size as, with pressure rating at least equal to and ends compatible with, pipes to be joined.
    d. Center-Sleeve Material: Manufacturer's standard
    e. Gasket Material: Natural or synthetic rubber.
    f. Metal Component Finish: Corrosion-resistant coating or material.

PART 3 EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations from layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

K. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

L. Install storm drainage piping at the following minimum slopes unless otherwise indicated:
   1. Building Storm Drain: 1 percent downward in direction of flow for piping NPS 3 and smaller; 2 percent downward in direction of flow for piping NPS 4 and larger.
   2. Horizontal Storm-Drainage Piping: 2 percent downward in direction of flow.

M. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

N. Install steel piping according to applicable plumbing code.

O. Plumbing Specialties:
   1. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers in storm drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping. Comply with requirements for cleanouts specified in Section 221423 "Storm Drainage Piping Specialties."
   2. Install drains in storm drainage gravity-flow piping. Comply with requirements for drains specified in Section 221423 "Storm Drainage Piping Specialties."

P. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

Q. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

R. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

A. Hubless, Cast-Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

3.3 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:
   1. Install transition couplings at joints of piping with small differences in OD's.
   2. In Drainage Piping: Shielded, non-pressure transition couplings.
   3. In Aboveground Force-Main Piping: Fitting-type transition couplings.
   4. In Underground Force-Main Piping:
      a. NPS 1-1/2 and Smaller: Fitting-type transition couplings.
      b. NPS 2 and Larger: Pressure transition couplings.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
   1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
   2. Install fiberglass pipe hangers for horizontal piping in corrosive environments.
   3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
   4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
   5. Vertical Piping: MSS Type 8 or Type 42, clamps.
   6. Individual, Straight, Horizontal Piping Runs:
      a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
      b. Longer than 100 Feet: MSS Type 1, adjustable, steel clevis hangers.
   7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
   8. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support horizontal piping and tubing within 18 inches of each fitting, valve, and coupling.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
6. Spacing for 10-foot pipe lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

F. Install supports for vertical cast-iron soil piping every 15 feet.

G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

C. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

D. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.6 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Test Procedure: Test storm drainage piping [**, except outside leaders,**] on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts until completion of inspection, water level must not drop. Inspect joints for leaks.
4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

3.7 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.8 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground storm drainage piping NPS 6 and smaller shall be any of the following:
   1. Hubless, cast-iron soil pipe and fittings; CISPI, heavy-duty, hubless-piping couplings; and coupled joints.

C. Aboveground, storm drainage piping NPS 8 and larger shall be any of the following:
   1. Hubless, cast-iron soil pipe and fittings; CISPI, heavy-duty, hubless-piping couplings; and coupled joints.

D. Underground storm drainage piping NPS 6 and smaller shall be any of the following:
   1. Hubless, cast-iron soil pipe and fittings; CISPI, heavy-duty, hubless-piping couplings; and coupled joints.
   2. Dissimilar Pipe-Material Couplings: Shielded, non-pressure transition couplings.

E. Underground, storm drainage piping NPS 8 and larger shall be any of the following:
   1. Hubless, cast-iron soil pipe and fittings; CISPI, heavy-duty, hubless-piping couplings; and coupled joints.
   2. Dissimilar Pipe-Material Couplings: Shielded, non-pressure transition couplings.

END OF SECTION

SECTION 230500
COMMON WORK RESULTS FOR HVAC

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This specification section covers the general scope of work required for the demolition of the existing HVAC systems ductwork, equipment, piping, controls and other HVAC systems work and to provide continued HVAC services for the Terrace level on a temporary basis and also to maintain continuity and operation of the existing HVAC systems serving all levels and areas of the State Capitol building during all phases of construction.

B. Work Package WP-1 Scope of work:

1. The HVAC drawings show all existing HVAC ductwork, piping and equipment/systems as can be viewed or as indicated on previous contract documents available. This contractor shall field verify all existing conditions to determine the entire extent of existing HVAC systems ductwork, piping, controls, devices, and equipment. This contractor shall leave all existing HVAC systems ductwork, piping, controls, devices, and equipment that are necessary to serve the occupied building areas.
2. Where any ductwork, piping, controls, or equipment needs to be removed to accommodate a wall, floor, or ceiling removal, extend temporary ductwork, piping, or controls, to maintain HVAC systems operations for occupied areas of the building.
3. It is not intended by the contract drawings that all work shown on the WP-1 drawings shown dashed be removed at this time.

C. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Transition fittings.
3. Dielectric fittings.
4. HVAC demolition.
5. Supports and anchorages.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.

1.4 QUALITY ASSURANCE

A. Comply with ASHRAE Guideline 4 – 2008 Preparation of operating and maintenance documentation for building systems.

B. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

C. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."

2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

D. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.5 GUIDELINES, CODES AND STANDARDS

A. Refer to the most recently published edition for references to guidelines, and standards (examples: ASHRAE, NFPA, AWWA, ASTM) unless a specific edition is listed.

B. Installation and materials shall comply with applicable national, state, and local codes and ordinances.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Deliver ducts and air handling equipment with factory or shop applied protective covering. Protective covering shall remain until installation.

C. Materials and equipment stored on site shall have a protective covering; open ends on equipment connections and ducts shall be covered. Duct liner shall be encapsulated.

1.7 COORDINATION

A. Common Work Results

1. Many components of the building are historic. Preservation of historic materials is of high priority. All removal and installation of systems shall be coordinated with the Architectural drawings. Diligent effort is to be used when coordinating any removal or installation of systems. The contractor shall inform the Architect and Engineer of impact on any historical material that is not noted on the architectural drawings.
2. Existing systems may be concealed within walls and vertical chases that are noted for demolition. The Contractor shall be responsible to identify the locations of all systems within walls or shafts and to protect those systems that serve occupied spaces in the building at the Terrace level and all upper floors. The Contractor shall inform the Architect and Engineer of impact to building systems serving occupied spaces.

B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.

C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

D. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

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 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 23 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
   1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
      a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
      b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
   2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 DIELECTRIC FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Hart Industries, International, Incorporated (www.hartindustries.com)
   2. Pipeline Seal and Insulator, Incorporated (Pipeline Seal and Insulator, Incorporated)
   3. Watts Industries, Incorporated; Water Products Division (www.watts.com)

B. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

C. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

D. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
   1. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.

E. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 degrees F.

PART 3 EXECUTION

3.1 HVAC DEMOLITION

A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove HVAC systems, equipment, and components indicated to be removed.
   1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.

2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
5. Equipment to Be Removed: Disconnect and cap services and remove equipment.
6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.

B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Sleeves are not required for core-drilled holes through walls.

K. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:
   1. Install unions, in steel piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
   2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
   3. Wet Piping Systems: Install dielectric nipple fittings to connect piping materials of dissimilar metals.

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.6 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor HVAC materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.7 SEALANTS

A. Comply with joint-sealant materials and applications specified in Section 078400 “Firestopping,” Section 078443 “Fire-resistant Joint Sealants,” Section 079000 “Joint Protection,” and Section 092900 “Gypsum Board: Acoustical sealants.”

END OF SECTION

SECTION 230523
GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This specification section covers the general scope of work required for the demolition of the existing HVAC ductwork, piping, equipment and control systems and to provide continued HVAC services for remaining HVAC systems on this Terrace level on a temporary basis and also to maintain continuity and operation of the existing HVAC ductwork, piping, control, and equipment systems serving all levels and areas of the State Capitol building during all phases of construction. This section contains materials and equipment that may be necessary to make temporary connections of the systems for continued operation of the HVAC systems serving entire building.

B. Section Includes:

1. Bronze ball valves.
2. Iron, single-flange butterfly valves.
3. Iron, grooved-end butterfly valves.
4. Bronze lift-check valves.
5. Bronze swing-check valves.
6. Iron swing check valves.
7. Iron swing check valves with closure control.
8. Iron, grooved-end swing-check valves.
9. Iron gate valves.

C. Related Sections:

1. Division 23 HVAC piping Sections for specialty valves applicable to those Sections only.

1.3 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, gate, and globe valves closed to prevent rattling.
4. Set ball and plug valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to HVAC valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:
   1. Gear Actuator: For quarter-turn valves NPS 8 and larger.
   2. Handwheel: For valves other than quarter-turn types.
   3. Hand lever: For quarter-turn valves NPS 6 and smaller.
   4. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 5 plug valves, for each size square plug-valve head.

E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
   1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
   2. Butterfly Valves: With extended neck.

F. Valve-End Connections:
   1. Flanged: With flanges according to ASME B16.1 for iron valves.
   2. Grooved: With grooves according to AWWA C606.
   3. Solder Joint: With sockets according to ASME B16.18.
   4. Threaded: With threads according to ASME B1.20.1.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES

A. Two-Piece, Regular-Port, Bronze Ball Valves with Bronze Trim; MSS-SP110:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Conbraco Industries, Incorporated; Apollo Valves. (Example 100-70-XX) (www.apollovalves.com)
      b. Crane Co.; Crane Valve Group; (Example 9210) (www.cranevalve.com)
      c. Hammond Valve. (www.hammondvalve.com) (Example 8501)
      d. Milwaukee Valve Company. (www.milwaukeevalve.com) (Example BA-100)
      e. NIBCO Incorporated (www.nibco.com) (Example T580-70)
   2. Description:
      a. Standard: MSS SP-110.
      b. SWP Rating: 150 psig.
      c. CWP Rating: 600 psig.
      d. Body Design: Two piece.
      e. Body Material: Bronze.
      f. Ends: Threaded.
      g. Seats: PTFE or TFE.
      h. Stem: Bronze.
      i. Ball: Chrome-plated brass.
      j. Port: Regular.

2.3 IRON, SINGLE-FLANGE BUTTERFLY VALVES

A. 200 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Aluminum-Bronze Disc:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Conbraco Industries, Incorporated; Apollo Valves. (Example 143 Series) (www.apollovalves.com)

b. Crane Company; Crane Valve Group; Stockham Division (www.stockham.com). (Example LD 712)
c. Legend Valve. (www.legendvalve.com) (Example T365AB)
d. Milwaukee Valve Company. (www.milwaukeevalve.com) (Example CL223-E)
e. NIBCO Incorporated (www.nibco.com) (Example LD2000-3)
f. Spence Strainers International; a division of CIRCOR International. (Example BF Series)
g. Watts Regulator Co.; a division of Watts Water Technologies, (Example BF-03) (www.watts.com)

2. Description:
   a. Standard: MSS SP-67, Type I.
   b. CWP Rating: 200 psig.
   c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
   d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
   e. Seat: EPDM.
   f. Stem: One- or two-piece stainless steel.
   g. Disc: Aluminum bronze.

2.4 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Crane Company; Crane Valve Group; Crane Valves (www.cranevalve.com)
   b. Crane Company; Crane Valve Group; Jenkins Valves (www.jlvalve.com)
   c. Crane Company; Crane Valve Group; Stockham Division (www.stockham.com).
   d. Hammond Valve. (www.hammondvalve.com)
   e. Kitz Corporation. (www.kitz.com)
   f. Milwaukee Valve Company. (www.milwaukeevalve.com) (Example 509T)
   g. NIBCO Incorporated (www.nibco.com) (Example T-413-BY)
   h. Red-White Valve Corporation. (www.redwhitevalvecorp.com)
   i. Watts Regulator Co.; a division of Watts Water Technologies, Incorporated. (www.watts.com)
2. Description:
   a. Standard: MSS SP-80, Type 4.
   b. CWP Rating: 200 psig.
   c. Body Design: Horizontal flow.
   d. Body Material: ASTM B 62, bronze.
   e. Ends: Threaded.
   f. Disc: PTFE or TFE.

B. with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Crane Company; Crane Valve Group; Crane Valves (www.cranevalve.com)
   b. Crane Company; Crane Valve Group; Jenkins Valves (www.jlvalve.com)
   c. Hammond Valve. (www.hammondvalve.com)
   d. Milwaukee Valve Company. (www.milwaukeevalve.com) (Example #510T)
   e. NIBCO Incorporated (www.nibco.com) (Example #T433-Y)
   f. Watts Regulator Co.; a division of Watts Water Technologies, Incorporated. (www.watts.com)
2. Description:
   a. Standard: MSS SP-80, Type 4.
   b. CWP Rating: 300 psig.
   c. Body Design: Horizontal flow.
   d. Body Material: ASTM B 62, bronze.
   e. Ends: Threaded.
   f. Disc: PTFE or TFE.

2.5 IRON SWING CHECK VALVES

A. Class 125, Iron Swing Check Valves with Metal Seats:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Crane Company; Crane Valve Group; Crane Valves (www.cranevalve.com) (Example: 373)
      b. Crane Company; Crane Valve Group; Jenkins Valves (www.jlvalve.com) (Example: 587J)
      c. Crane Company; Crane Valve Group; Stockham Division (www.stockham.com).
      d. Hammond Valve. (www.hammondvalve.com)
      e. Kitz Corporation. (www.kitz.com)
      f. Legend Valve. (www.legendvalve.com)
      g. Milwaukee Valve Company. (www.milwaukeevalve.com)
      h. NIBCO Incorporated (www.nibco.com)
      i. Powell valves. (www.powellvalves.com)
      j. Red-White Valve Corporation. (www.redwhitevalvecorp.com)
      k. Sure Flow Equipment Incorporated. (www.sureflowequipment.com)
      l. Watts Regulator Co.; a division of Watts Water Technologies, Incorporated. (www.watts.com)
      m. Zy-Tech Global Industries, Incorporated.
   2. Description:
      a. Standard: MSS SP-71, Type I.
      b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
      c. NPS 14 to NPS 24, CWP Rating: 150 psig.
      d. Body Design: Clear or full waterway.
      e. Body Material: ASTM A 126, gray iron with bolted bonnet.
      f. Ends: Flanged.
      g. Trim: Bronze.
      h. Gasket: Asbestos free.

B. Class 250, Iron Swing Check Valves with Metal Seats:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Crane Company; Crane Valve Group; Crane Valves (www.cranevalve.com)
      b. Crane Company; Crane Valve Group; Jenkins Valves (www.jlvalve.com)
      c. Crane Company; Crane Valve Group; Stockham Division (www.stockham.com).
      d. Hammond Valve. (www.hammondvalve.com)
      e. Milwaukee Valve Company. (www.milwaukeevalve.com)
      f. NIBCO Incorporated (www.nibco.com)
      g. Watts Regulator Co.; a division of Watts Water Technologies, Incorporated. (www.watts.com)
   2. Description:
      a. Standard: MSS SP-71, Type I.
      b. NPS 2-1/2 to NPS 12, CWP Rating: 500 psig.
      c. NPS 14 to NPS 24, CWP Rating: 300 psig.
      d. Body Design: Clear or full waterway.
      e. Body Material: ASTM A 126, gray iron with bolted bonnet.
      f. Ends: Flanged.
      g. Trim: Bronze.
      h. Gasket: Asbestos free.

2.6 IRON SWING CHECK VALVES WITH CLOSURE CONTROL

A. Class 125, Iron Swing Check Valves with Lever- and Spring-Closure Control:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. NIBCO Incorporated (www.nibco.com) (Example W920-W)
   2. Description:
      a. Standard: MSS SP-71, Type I.
      b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
      c. NPS 14 to NPS 24, CWP Rating: 150 psig.

d. Body Design: Clear or full waterway.
e. Body Material: ASTM A 126, gray iron with bolted bonnet.
f. Ends: Flanged.
g. Trim: Bronze.
h. Gasket: Asbestos free.
i. Closure Control: Factory-installed, exterior lever and spring.

B. Class 125, Iron Swing Check Valves with Lever and Weight-Closure Control:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Crane Company; Crane Valve Group; Crane Valves (www.cranevalve.com)
b. Crane Company; Crane Valve Group; Jenkins Valves (www.jlvalve.com)
c. Crane Company; Crane Valve Group; Stockham Division (www.stockham.com).
d. Hammond Valve. (www.hammondvalve.com)
e. Milwaukee Valve Company. (www.milwaukeevalve.com)
f. NIBCO Incorporated (www.nibco.com) (Example F918-BL&S or F918-BLW)
g. Watts Regulator Co.; a division of Watts Water Technologies, Incorporated. (www.watts.com)
2. Description:
a. Standard: MSS SP-71, Type I.
b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
c. NPS 14 to NPS 24, CWP Rating: 150 psig.
d. Body Design: Clear or full waterway.
e. Body Material: ASTM A 126, gray iron with bolted bonnet.
f. Ends: Flanged.
g. Trim: Bronze.
h. Gasket: Asbestos free.
i. Closure Control: Factory-installed, exterior lever and weight.

2.7 IRON, PLATE-TYPE CHECK VALVES

A. Class 125, Iron, Dual-Plate Check Valves with Metal Seat:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. APCO Willamette Valve and Primer Corporation. (www.apcovalves.com)
b. Crane Company; Crane Valve Group; Crane Valves (www.cranevalve.com)
c. Flomatic Corporation. (www.flomatic.com)
d. Mueller Steam Specialty; a division of SPX Corporation. (www.muellersteam.com)
2. Description:
a. Standard: API 594.
b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
c. NPS 14 to NPS 24, CWP Rating: 150 psig.
d. Body Design: Wafer, spring-loaded plates.
e. Body Material: ASTM A 126, gray iron.
f. Seat: Bronze.

B. Class 150, Iron, Dual-Plate Check Valves with Metal Seat:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. APCO Willamette Valve and Primer Corporation. (www.apcovalves.com)
b. Crane Company; Crane Valve Group; Crane Valves (www.cranevalve.com)
c. Mueller Steam Specialty; a division of SPX Corporation. (www.muellersteam.com)
d. Val-Matic Valve & Manufacturing Corporation. (www.valmatic.com)
2. Description:
a. Standard: API 594.
b. NPS 2-1/2 to NPS 12, CWP Rating: 300 psig.
c. NPS 14 to NPS 24, CWP Rating: 250 psig.
d. Body Design: Wafer, spring-loaded plates.
e. Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
f. Seat: Bronze.

C. Class 250, Iron, Dual-Plate Check Valves with Metal Seat:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. APCO Willamette Valve and Primer Corporation. (www.apcovalves.com)
      b. Crane Company; Crane Valve Group; Crane Valves (www.cranevalve.com)
   2. Description:
      a. Standard: API 594.
      b. NPS 2-1/2 to NPS 12, CWP Rating: 400 psig.
      c. NPS 14 to NPS 24, CWP Rating: 300 psig.
      d. Body Design: Wafer, spring-loaded plates.
      e. Body Material: ASTM A 126, gray iron.
      f. Seat: Bronze.

D. Class 300, Iron, Dual-Plate Check Valves with Metal Seat:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. APCO Willamette Valve and Primer Corporation. (www.apcovalves.com)
      b. Crane Company; Crane Valve Group; Crane Valves (www.cranevalve.com)
      c. Mueller Steam Specialty; a division of SPX Corporation. (www.muellersteam.com)
      d. Val-Matic Valve & Manufacturing Corporation. (www.valmatic.com)
   2. Description:
      a. Standard: API 594.
      b. NPS 2-1/2 to NPS 12, CWP Rating: 500 psig.
      c. NPS 14 to NPS 24, CWP Rating: 400 psig.
      d. Body Design: Wafer, spring-loaded plates.
      e. Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
      f. Seat: Bronze.

E. Class 125, Iron, Single-Plate Check Valves with Resilient Seat:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Flo Fab Incorporated. (www.flofab.com)
      b. Sure Flow Equipment Incorporated. (www.sureflowequipment.com)
   2. Description:
      a. Standard: API 594.
      b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
      c. NPS 14 to NPS 24, CWP Rating: 150 psig.
      d. Body Design: Wafer, spring-loaded plate.
      e. Body Material: ASTM A 126, gray iron.
      f. Seat: EPDM.

F. Class 125, Iron, Dual-Plate Check Valves with Resilient Seat:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. APCO Willamette Valve and Primer Corporation. (www.apcovalves.com)
      b. Cooper Cameron Valves TVB Techno. (www.c-a-m.com)
      c. Crane Company; Crane Valve Group; Crane Valves (www.cranevalve.com)
      d. Crane Company; Crane Valve Group; Stockham Division (www.stockham.com).
      e. NIBCO Incorporated (www.nibco.com)
      f. Spence Strainers International; a division of CIRCOR International.
      g. Sure Flow Equipment Incorporated. (www.sureflowequipment.com)
      h. Watts Regulator Co.; a division of Watts Water Technologies, Incorporated. (www.watts.com)
   2. Description:
      a. Standard: API 594.
      b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
      c. NPS 14 to NPS 24, CWP Rating: 150 psig.
      d. Body Design: Wafer, spring-loaded plates.
      e. Body Material: ASTM A 126, gray iron.
      f. Seat: EPDM.

G. Class 150, Iron, Dual-Plate Check Valves with Resilient Seat:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. APCO Willamette Valve and Primer Corporation. (www.apcovalves.com)
      b. Crane Company; Crane Valve Group; Crane Valves (www.cranevalve.com)
      c. Crane Company; Crane Valve Group; Jenkins Valves (www.jlvalve.com)
      d. Val-Matic Valve & Manufacturing Corporation. (www.valmatic.com)
   2. Description:
      a. Standard: API 594.
      b. NPS 2-1/2 to NPS 12, CWP Rating: 300 psig.
      c. NPS 14 to NPS 24, CWP Rating: 250 psig.
      d. Body Design: Wafer, spring-loaded plates.
      e. Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
      f. Seat: EPDM.

H. Class 250, Iron, Wafer, Single-Plate Check Valves with Resilient Seat:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Sure Flow Equipment Incorporated. (www.sureflowequipment.com)
   2. Description:
      a. Standard: API 594.
      b. NPS 2-1/2 to NPS 12, CWP Rating: 400 psig.
      c. NPS 14 to NPS 24, CWP Rating: 300 psig.
      d. Body Design: Wafer, spring-loaded plate.
      e. Body Material: ASTM A 126, gray iron.
      f. Seat: EPDM.

I. Class 250, Iron, Dual-Plate Check Valves with Resilient Seat:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. APCO Willamette Valve and Primer Corporation. (www.apcovalves.com)
      b. Crane Company; Crane Valve Group; Crane Valves (www.cranevalve.com)
      c. Sure Flow Equipment Incorporated. (www.sureflowequipment.com)
   2. Description:
      a. Standard: API 594.
      b. NPS 2-1/2 to NPS 12, CWP Rating: 400 psig.
      c. NPS 14 to NPS 24, CWP Rating: 300 psig.
      d. Body Design: Wafer, spring-loaded plates.
      e. Body Material: ASTM A 126, gray iron.
      f. Seat: EPDM.

J. Class 300, Iron, Dual-Plate Check Valves with Resilient Seat:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. APCO Willamette Valve and Primer Corporation. (www.apcovalves.com)
      b. Val-Matic Valve & Manufacturing Corporation. (www.valmatic.com)
   2. Description:
      a. Standard: API 594.
      b. NPS 2-1/2 to NPS 12, CWP Rating: 500 psig.
      c. NPS 14 to NPS 24, CWP Rating: 400 psig.
      d. Body Design: Wafer, spring-loaded plates.
      e. Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
      f. Seat: EPDM.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.
2. Lift Check Valves: With stem upright and plumb.

3.3 JOINT CONSTRUCTION

A. Refer to Division 23 Section "Common Work Results for HVAC" for basic piping joint construction.

3.4 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.5 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, butterfly valves.
2. Butterfly Valve Dead-End Service: Single-flange (lug) type.
3. Throttling Service except Steam: Globe, ball, or butterfly valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 3 and Smaller: Threaded ends.
2. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
3. For Steel Piping, NPS 5 and Larger: Flanged ends.
4. For Grooved-End Steel Piping except Steam and Steam Condensate Piping: Valve ends may be grooved.

3.6 CHILLED-WATER VALVE SCHEDULE

A. Pipe NPS 3 and Smaller:

1. Ball Valves, NPS 3 and Smaller: Two piece, 600-psig CWP rating, copper alloy.
2. Bronze Swing Check Valves: Class 125, bronze disc.

B. Pipe NPS 4 and Larger:

1. Butterfly Valves: Tapped Lug, 300-psig CWP rating, ferrous alloy, with EPDM liner.
2. Grooved-End, Ductile-Iron Butterfly Valves: 300-psig CWP rating.
3. High-Performance Butterfly Valves: Class 150, single flange.
4. Iron Swing Check Valves: Class 125, metal seats.

3.7 HEATING-WATER VALVE SCHEDULE

A. Pipe NPS 3 and Smaller:

1. Ball Valves, NPS 3 and Smaller: Two piece, 600-psig CWP rating, copper alloy.
2. Bronze Swing Check Valves: Class 125, bronze disc.

B. Pipe NPS 4 and Larger:

1. Butterfly Valves: Tapped Lug, 300-psig CWP rating, ferrous alloy, with EPDM liner.
2. Grooved-End, Ductile-Iron Butterfly Valves: 300-psig CWP rating.
3. High-Performance Butterfly Valves: Class 150, single flange.
4. Iron Swing Check Valves: Class 125, metal seats.

END OF SECTION

SECTION 230713
DUCT INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. This specification section covers the general scope of work required for the demolition of the existing HVAC ductwork, piping, equipment and control systems and to provide continued HVAC services for remaining HVAC systems on this Terrace level on a temporary basis and also to maintain continuity and operation of the existing HVAC ductwork, piping, control, and equipment systems serving all levels and areas of the State Capitol building during all phases of construction. This section contains materials and equipment that may be necessary to make temporary connections of the systems for continued operation of the HVAC systems serving entire building.

B. Section includes insulating the following duct services:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Outdoor, exposed supply, return, and exhaust air.

C. Related Sections:

1. Section 230716 "HVAC Equipment Insulation."
2. Section 230719 "HVAC Piping Insulation."
3. Section 233113 "Metal Ducts" for duct liners.

1.2 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.4 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

PART 2 PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.

B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

C. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

D. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type II for sheet materials.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Aeroflex USA, Inc.; Aerocel.
   b. Armacell LLC; AP Armaflex.
   c. K-Flex USA; Insul-Sheet, K-Flex Gray Duct Liner, and K-FLEX LS.

E. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FRK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. CertainTeed Corp.; SoftTouch Duct Wrap.
   b. Johns Manville; Microlite.
   c. Knauf Insulation; Friendly Feel Duct Wrap.
   d. Manson Insulation Inc.; Alley Wrap.
   e. Owens Corning; SOFTR All-Service Duct Wrap.

F. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied FRK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. CertainTeed Corp.; Commercial Board.
   b. Fibrex Insulations Inc.; FBX.
   c. Johns Manville; 800 Series Spin-Glas.
   d. Knauf Insulation; Insulation Board.
   e. Manson Insulation Inc.; AK Board.
   f. Owens Corning; Fiberglas 700 Series.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to it and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Aeroflex USA, Inc.; Aeroseal.
   b. Armacell LLC; Armaflex 520 Adhesive.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.K-Flex USA; R-373 Contact Adhesive.

C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.Eagle Bridges - Marathon Industries; 225.
   b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.Mon-Eco Industries, Inc.; 22-25.

2.3 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.4 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

2.5 TAPES

A. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. ABI, Ideal Tape Division; 488 AWF.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
   c. Compac Corporation; 120.
   d. Venture Tape; 3520 CW.
2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.6 SECUREMENTS

A. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding,**0.105-inch** diameter shank, length to suit depth of insulation indicated.
   a. Products: Subject to compliance with requirements, provide one of the following:
      (a) AGM Industries, Inc.; CWP-1.
      (b) GEMCO; CD.
      (c) Midwest Fasteners, Inc.; CD.
      (d) Nelson Stud Welding; TPA, TPC, and TPS.
2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, **0.105-inch** diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
   a. Products: Subject to compliance with requirements, provide one of the following:
      (a) AGM Industries, Inc.; CHP-1.
      (b) GEMCO; Cupped Head Weld Pin.
      (c) Midwest Fasteners, Inc.; Cupped Head.
      (d) Nelson Stud Welding; CHP.
3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, and securely in position indicated when self-locking washer is in place. Comply with the following requirements:
   a. Products: Subject to compliance with requirements, provide one of the following:
      1) AGM Industries, Inc.; Tactoo Perforated Base Insul-Hangers.
      2) GEMCO; Perforated Base.
      3) Midwest Fasteners, Inc.; Spindle.
   b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
   c. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
   d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
4. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, and securely in position indicated when self-locking washer is in place. Comply with the following requirements:

a. Products: Subject to compliance with requirements, provide one of the following:
   1) GEMCO; Nylon Hangers.
   2) Midwest Fasteners, Inc.; Nylon Insulation Hangers.
b. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.
c. Spindle: Nylon, 0.106-inch- diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches.
d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

5. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, and securely in position indicated when self-locking washer is in place. Comply with the following requirements:
   a. Products: Subject to compliance with requirements, provide one of the following:
      1) AGM Industries, Inc.; Tactoo Self-Adhering Insul-Hangers.
      2) GEMCO; Peel & Press.
      3) Midwest Fasteners, Inc.; Self Stick.
   b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
   c. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
   d. Adhesive-backed base with a peel-off protective cover.

B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. AGM Industries, Inc.; RC-150.
      b. GEMCO; R-150.
      c. Midwest Fasteners, Inc.; WA-150.
      d. Nelson Stud Welding; Speed Clips.
   2. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

C. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. GEMCO.
      b. Midwest Fasteners, Inc.

D. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

E. Wire: 0.062-inch soft-annealed, stainless steel.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. C & F Wire.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
   1. Verify that systems to be insulated have been tested and are free of defects.
   2. Verify that surfaces to be insulated are clean and dry.

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

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
   1. Install insulation continuously through hangers and around anchor attachments.
   2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
   3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:
   1. Draw jacket tight and smooth.
   2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
   3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
      a. For below ambient services, apply vapor-barrier mastic over staples.
   4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
   5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

1. Comply with requirements in Section 078413 "Penetration Firestopping"irestopping and fire-resistive joint sealers.

C. Insulation Installation at Floor Penetrations:
   1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
   2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 INSTALLATION OF MINERAL-FIBER INSULATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
   1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 75 percent coverage of duct and plenum surfaces.
   2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
   3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
      a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
      b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
      c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
      d. Do not over compress insulation during installation.
      e. Impale insulation over pins and attach speed washers.
      f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
   4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
      a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
      b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
   5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
   6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
   7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
   1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 75 percent coverage of duct and plenum surfaces.
   2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
   3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
      a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.

b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
d. Do not over compress insulation during installation.
e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
   a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
   b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:
   1. Draw jacket material smooth and tight.
   2. Install lap or joint strips with same material as jacket.
   3. Secure jacket to insulation with manufacturer's recommended adhesive.
   4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
   5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

3.7 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:
   1. Indoor, concealed supply and outdoor air.
   2. Indoor, exposed supply and outdoor air.
   3. Indoor, concealed return located in unconditioned space.
   4. Indoor, exposed return located in unconditioned space.
   5. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
   6. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
   7. Outdoor, concealed supply, return, and exhaust.
   8. Outdoor, exposed supply, return, and exhaust.

B. Items Not Insulated:
   1. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
   2. Factory-insulated flexible ducts.
   3. Factory-insulated plenums and casings.
   4. Flexible connectors.
   5. Vibration-control devices.
   6. Factory-insulated access panels and doors.

3.8 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed, rectangular, round, and flat-oval, plenum and supply-air duct insulation shall be one of the following:
   1. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.

B. Concealed, rectangular, round, and flat-oval, plenum and supply-air duct located in unconditioned spaces; insulation shall be the following:
   1. Mineral-Fiber Blanket: 3-inches thick and 0.75-lb/cu. ft. nominal density.

C. Concealed, rectangular, round, and flat-oval, plenum and return-air duct located in unconditioned spaces; insulation shall be the following:
   1. Mineral-Fiber Blanket: 3-inches thick and 0.75-lb/cu. ft. nominal density.

D. Concealed, rectangular, round, and flat-oval, plenum and outdoor-air duct insulation shall be one of the following:
   1. Mineral-Fiber Blanket: 3 inches thick and 0.75-lb/cu. ft. nominal density.

E. Concealed, rectangular, round, and flat oval, plenum and exhaust-air duct insulation between isolation damper and penetration of building exterior (minimum length; 10-feet) shall be the following:
   1. Mineral-Fiber Blanket: 3 inches thick and 0.75-lb/cu. ft. nominal density.

F. Exposed, round and flat-oval, supply-air duct insulation shall be the following:
   1. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.

G. Exposed, round and flat-oval, supply-air duct located in unconditioned spaces: insulation shall be the following:
   1. Mineral-Fiber Blanket: 3-inches thick and 0.75-lb/cu. ft. nominal density.

H. Exposed, round and flat-oval, return-air duct located in unconditioned spaces: insulation shall be the following:
   1. Mineral-Fiber Blanket: 3-inches thick and 0.75-lb/cu. ft. nominal density.

I. Exposed, round and flat-oval, outdoor-air duct insulation shall be the following:
   1. Mineral-Fiber Blanket: 3 inches thick and 0.75-lb/cu. ft. nominal density.

J. Exposed, rectangular, plenum and supply-air duct insulation shall be the following:
   1. Mineral-Fiber Board: 1-1/2 inches thick and 3-lb/cu. ft. nominal density.

K. Exposed, rectangular, supply-air duct located in unconditioned spaces: insulation shall be the following:
   1. Mineral-Fiber Board: 2 inches thick and 3-lb/cu. ft. nominal density.

L. Exposed, rectangular, return-air duct located in unconditioned spaces: insulation shall be the following:
   1. Mineral-Fiber Board: 2 inches thick and 3-lb/cu. ft. nominal density.

M. Exposed, rectangular, outdoor-air duct insulation shall be the following:
   1. Mineral-Fiber Board: 2 inches thick and 3-lb/cu. ft. nominal density.

N. Exposed, rectangular, round, and flat-oval, plenum and exhaust-air duct located with 10-feet of the exterior wall penetration; insulation shall be the following:
   1. Mineral-Fiber Board: 2 inches thick and 3-lb/cu. ft. nominal density.

O. Exposed, outdoor-air plenum insulation shall be the following:
   1. Mineral-Fiber Board: 2 inches thick and 3-lb/cu. ft. nominal density.

3.9 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Ducts and Plenums, Concealed:
   1. None.

D. Ducts and Plenums, Exposed:
   1. None.

END OF SECTION

SECTION 230719
HVAC PIPING INSULATION

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 specification section covers the general scope of work required for the demolition of the existing HVAC ductwork, piping, equipment and control systems and to provide continued HVAC services for remaining HVAC systems on this Terrace level on a temporary basis and also to maintain continuity and operation of the existing HVAC ductwork, piping, control, and equipment systems serving all levels and areas of the State Capitol building during all phases of construction. This section contains materials and equipment that may be necessary to make temporary connections of the systems for continued operation of the HVAC systems serving entire building.

B. Section includes insulating the following HVAC piping systems:
   1. Chilled-water, **indoors**.
   2. Heating hot-water piping, **indoors**.

1.3 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
   1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
   2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.5 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.6 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Products shall not contain asbestos, lead, mercury, or mercury compounds.

B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

C. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

D. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

E. Calcium Silicate:
   1. Products: Subject to compliance with requirements provide one of the following:
      a. Industrial Insulation Group (IIG); Thermo-12 Gold. (www.iig-llc.com)
   2. Thermal conductivity (k-value) at 400 degrees F is 0.49 Btu x in. /h x sq. ft. x degrees F or less.
   3. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
   4. Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
   5. Prefabricated Fitting Covers: Comply with ASTM C 450 and ASTM C 585 for dimensions used in pre-forming insulation to cover valves, elbows, tees, and flanges.

F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
   1. Products: Subject to compliance with requirements provide one of the following:
      a. CertainTeed Corporation; (www.certainteed.com)
      b. Johns Manville; Microlite. (www.jm.com)
      c. Knauf Insulation; (www.knaufinsulation.us)
      d. Manson Insulation Inc.; Alley Wrap. (www.isolationmanson.com)
      e. Owens Corning; SOFTR All-Service Duct Wrap. (commercial.owenscorning.com)
   2. Thermal conductivity (k-value) at 150 degrees F is 0.27 Btu x in. /h x sq. ft. x degrees F or less.

G. Mineral-Fiber, Preformed Pipe Insulation:
   1. Products: Subject to compliance with requirements provide one of the following:
      a. Fibrex Insulations Inc.; Coreplus 1200. (www.fibrex.com)
      b. Johns Manville; Micro-Lok. (www.jm.com)
      c. Knauf Insulation; 1000-Degree Pipe Insulation. (www.knaufinsulation.us)
      d. Manson Insulation Inc.; Alley-K. (www.isolationmanson.com)
      e. Owens Corning; Fiberglas Pipe Insulation. (commercial.owenscorning.com)

H. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semi-rigid board material with factory-applied FSK jacket complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more.
   1. Products: Subject to compliance with requirements provide one of the following:
      a. CertainTeed Corp.; CrimpWrap. (www.certainteed.com)
      b. Johns Manville; MicroFlex. (www.jm.com)
      c. Knauf Insulation; Pipe and Tank Insulation. (www.knaufinsulation.us)
      d. Manson Insulation Inc.; AK Flex. (www.isolationmanson.com)
      e. Owens Corning; Fiberglas Pipe and Tank Insulation. (commercial.owenscorning.com)
   2. Thermal conductivity (k-value) at 150 deg F is 0.27 Btu x in. /h x sq. ft. x degrees F or less.
   3. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

I. Phenolic:
   1. Products: Subject to compliance with requirements provide one of the following:
      a. ITW Insulation Systems; Trymer Green. (www.itwinsulation.com)

b. Kingspan Tarec Industrial Insulation NV; Koolphen K. (www.kingspantarec.com)
c. Resolco International BV; Insul-phen. (www.resolco.com)

2. Thermal conductivity (k-value) at 75 degrees F is 0.15 Btu x in. /h x sq. ft. x degrees F or less.
3. Preformed pipe insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type III, Grade 1.
4. Block insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type II, Grade 1.
5. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
6. Factory-Applied Jacket: Requirements are specified in "Factory-Applied Jackets" Article.
   a. Preformed Pipe Insulation: ASJ.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800 degrees F.
   1. Products: Subject to compliance with requirements provide one of the following:
      a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-97. (www.idccorp.com)
      b. Eagle Bridges - Marathon Industries; 290. (www.eaglebridges.com)
      c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-27. (www.fosterproducts.com)
      d. Mon-Eco Industries, Incorprated (www.mon-ecoindustries.com)
      e. Vimasco Corporation; 760. (www.vimasco.com)

C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
   1. Products: Subject to compliance with requirements provide one of the following:
      a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127. (www.idccorp.com)
      b. Eagle Bridges - Marathon Industries; 225. (www.eaglebridges.com)
      c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70. (www.fosterproducts.com)
      d. Mon-Eco Industries, Incorporated; 22-25. (www.mon-ecoindustries.com)

D. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
   1. Products: Subject to compliance with requirements provide one of the following:
      a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82. (www.idccorp.com)
      b. Eagle Bridges - Marathon Industries; 225. (www.eaglebridges.com)
      c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50. (www.fosterproducts.com)
      d. Mon-Eco Industries, Incorporated; 22-25. (www.mon-ecoindustries.com)

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
   1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
   1. Products: Subject to compliance with requirements provide one of the following:
      a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90. (www.fosterproducts.com)
      b. Vimasco Corporation; 749. (www.vimasco.com)
   2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
   3. Service Temperature Range: Minus 20 to plus 180 degrees F.

4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.
1. Products: Subject to compliance with requirements provide one of the following:
a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-30. (www.idccorp.com)
b. Eagle Bridges - Marathon Industries; 501. (www.eaglebridges.com)
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-35. (www.fosterproducts.com)
d. Mon-Eco Industries, Inc.; 55-10. (www.mon-ecoindustries.com)
2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
3. Service Temperature Range: 0 to 180 degrees F.
4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
5. Color: White.

D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.
1. Products: Subject to compliance with requirements provide one of the following:
a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel. (www.idccorp.com)
b. Eagle Bridges - Marathon Industries; 570. (www.eaglebridges.com)
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96. (www.fosterproducts.com)
2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 degrees F.
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
1. Products: Subject to compliance with requirements provide one of the following:
a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10. (www.idccorp.com)
b. Eagle Bridges - Marathon Industries; 550. (www.eaglebridges.com)
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50. (www.fosterproducts.com)
d. Mon-Eco Industries, Inc.; 55-50. (www.mon-ecoindustries.com)
e. Vimasco Corporation; WC-1/WC-5. (www.vimasco.com)
2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 degrees F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.4 SEALANTS

A. Joint Sealants:
1. Products: Subject to compliance with requirements provide one of the following:
a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76. (www.idccorp.com)
b. Eagle Bridges - Marathon Industries; 405. (www.eaglebridges.com)
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45. (www.fosterproducts.com)
d. Mon-Eco Industries, Inc.; 44-05. (www.mon-ecoindustries.com)
e. Pittsburgh Corning Corporation; Pittseal 444.
2. Products: Subject to compliance with requirements provide one of the following:
a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-70. (www.idccorp.com)
b. Eagle Bridges - Marathon Industries; 405. (www.eaglebridges.com)
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45. (www.fosterproducts.com)
d. Mon-Eco Industries, Inc.; 44-05. (www.mon-ecoindustries.com)

3. Materials shall be compatible with insulation materials, jackets, and substrates.
4. Permanently flexible, elastomeric sealant.
5. Service Temperature Range: Minus 100 to plus 300 degrees F.
6. Color: White or gray.

B. FSK and Metal Jacket Flashing Sealants:
1. Products: Subject to compliance with requirements provide one of the following:
   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76. (www.idccorp.com)
   b. Eagle Bridges - Marathon Industries; 405. (www.eaglebridges.com)
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44. (www.fosterproducts.com)
   d. Mon-Eco Industries, Inc.; 44-05. (www.mon-ecoindustries.com)
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 degrees F.
5. Color: Aluminum.

2.5 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
4. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.
5. PVDC Jacket for Indoor Applications: 4-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perm when tested according to ASTM E 96/E 96M and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.
6. Products: Subject to compliance with requirements provide one of the following:
   1) Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film. (www.dow.com)
7. PVDC Jacket for Outdoor Applications: 6-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perm when tested according to ASTM E 96/E 96M and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E 84.
8. Products: Subject to compliance with requirements provide one of the following:
   1) Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film. (www.dow.com)
9. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.
10. Products: Subject to compliance with requirements provide one of the following:
    1) Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film. (www.dow.com)
11. Vinyl Jacket: White vinyl with a permeance of 1.3 perms when tested according to ASTM E 96/E 96M, Procedure A, and complying with NFPA 90A and NFPA 90B.

2.6 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
1. Products: Subject to compliance with requirements provide one of the following:
   a. Johns Manville; Zeston. (www.jm.com)

b. P.I.C. Plastics, Inc.; FG Series. (www.pic-plastics.com)
c. Proto Corporation; LoSmoke. (www.protocorporation.com)
d. Speedline Corporation; SmokeSafe. (www.speedlinepvc.com)
2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
a. Shapes: 45- and 90-degrees, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.7 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Products: Subject to compliance with requirements provide one of the following:
a. ABI, Ideal Tape Division; 428 AWF ASJ. (www.abitape.com)
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836. (www.stus.averydennison.com)
c. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ. (www.venturetape.com)
2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Products: Subject to compliance with requirements provide one of the following:
a. ABI, Ideal Tape Division; 491 AWF FSK. (www.abitape.com)
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827. (www.stus.averydennison.com)
c. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ. (www.venturetape.com)
2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
1. Products: Subject to compliance with requirements provide one of the following:
a. ABI, Ideal Tape Division; 370 White PVC tape. (www.abitape.com)
b. Venture Tape; 1506 CW NS. (www.venturetape.com)
2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
1. Products: Subject to compliance with requirements provide one of the following:
a. ABI, Ideal Tape Division; 488 AWF. (www.abitape.com)
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800. (www.stus.averydennison.com)
c. Venture Tape; 3520 CW. (www.venturetape.com)
2. Width: 2 inches.
3. Thickness: 3.7 mils.

4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.8 SECUREMENTS

A. Bands:
   1. Products: Subject to compliance with requirements provide one of the following:
      a. ITW Insulation Systems; Gerrard Strapping and Seals. (www.itwinsulation.com)
      b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs. (www.rprhouston.com)
   2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015 inch thick, 1/2 inch wide with wing seal.
   3. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

C. Wire: 0.080-inch nickel-copper alloy.
   1. Products: Subject to compliance with requirements provide one of the following:
      a. C & F Wire. (www.cfwireproducts.com)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
   1. Verify that systems to be insulated have been tested and are free of defects.
   2. Verify that surfaces to be insulated are clean and dry.
   3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
   1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 degrees F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
   2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
   1. Install insulation continuously through hangers and around anchor attachments.
   2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
   3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
   4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:
   1. Draw jacket tight and smooth.
   2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
   3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
      a. For below-ambient services, apply vapor-barrier mastic over staples.
   4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
   5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:
   1. Vibration-control devices.
   2. Testing agency labels and stamps.
   3. Nameplates and data plates.
   4. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
   1. Seal penetrations with flashing sealant.
   2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
   3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
   4. Seal jacket to wall flashing with flashing sealant.

B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

C. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
   1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

D. Insulation Installation at Floor Penetrations:
   1. Pipe: Install insulation continuously through floor penetrations.
   2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
   1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
   2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
   3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
   4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
   5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
   6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
   7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
   8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
   9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
   1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:
   1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
   2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
   3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
   4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:
   1. Install preformed pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
   3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
   4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:
   1. Install preformed sections of same material as straight segments of pipe insulation when available.
   2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:
   1. Install preformed sections of same material as straight segments of pipe insulation when available.
   2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
   3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
   4. Install insulation to flanges as specified for flange insulation application.

3.7 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:
   1. Draw jacket material smooth and tight.
   2. Install lap or joint strips with same material as jacket.
   3. Secure jacket to insulation with manufacturer's recommended adhesive.

4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

3.8 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
   1. Underground piping.

3.9 INDOOR PIPING INSULATION SCHEDULE

A. Condensate and Equipment Drain Water below 60 Degrees F:
   1. All Pipe Sizes: Insulation shall be one of the following:
      a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.

B. Chilled Water and Brine, 40 Degrees to 60 degrees F:
   1. NPS: All sizes
      a. Phenolic: 1 inch thick.

C. Heating-Hot-Water Supply and Return, 105 degrees to 140 degrees F:
   1. NPS 1.5 and Smaller: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe, Type I: 1.5-inches thick.
   2. NPS 2 and Larger: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe, Type I, 2-inches thick.

D. Heating-Hot-Water Supply and Return, 141 degrees to 200 degrees F:
   1. NPS 1.25 and Smaller: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe, Type I: 1.5-inches thick.
   2. NPS 1.5 and Larger: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe, Type I, 2-inches thick.

3.10 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:
   1. None.

D. Piping, Exposed:
   1. Prefabricated, Self-Adhering, Sheet-Type Waterproofing Membrane:

END OF SECTION

SECTION 232113
HYDRONIC PIPING

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 specification section covers the general scope of work required for the demolition of the existing HVAC ductwork, piping, equipment and control systems and to provide continued HVAC services for remaining HVAC systems on this Terrace level on a temporary basis and also to maintain continuity and operation of the existing HVAC ductwork, piping, control, and equipment systems serving all levels and areas of the State Capitol building during all phases of construction. This section contains materials and equipment that may be necessary to make temporary connections of the systems for continued operation of the HVAC systems serving entire building.

B. Section includes pipe and fitting materials and joining methods for the following:
   1. Hot-water heating piping.
   2. Chilled-water piping.
   3. Condensate-drain piping.
   4. Blowdown-drain piping.
   5. Air-vent piping.

1.3 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Installers of Pressure-Sealed Joints: Installers shall be certified by pressure-seal joint manufacturer as having been trained and qualified to join piping with pressure-seal pipe couplings and fittings.

B. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Pipe Welding: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
   1. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.
   2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

D. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 01.

1.4 COORDINATION

A. Coordinate layout and installation of hydronic piping and suspension system components with other construction, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

B. Coordinate pipe sleeve installations for foundation and exterior wall penetrations. Coordinate with requirements specified in Division 7 Sections for sealing pipe penetrations through exterior and foundation walls.

C. Coordinate pipe fitting pressure classes with products specified in related Sections.

D. Coordinate power requirements for hydronic specialties with Division 26 installer.

E. Coordinate the installation of hydronic control devices with Section 230900 “Instrumentation and Controls for HVAC”.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:
   1. Hot-Water Heating Piping: 125 psig at 200 degrees F.
   2. Chilled-Water Piping: 125 psig at 200 degrees F.
   3. Makeup-Water Piping: 80 psig at 150 degrees F.
   4. Condensate-Drain Piping: 150 degrees F.
   5. Air-Vent Piping: 200 degrees F.

2.2 COPPER TUBE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide copper tubing and fittings manufactured by one of the following:
   a. Cambridge-Lee Industries Incorporated.
   b. Cerro Flow Products Incorporated.
   c. Mueller Industries Incorporated.
   d. Nibco Incorporated

B. Drawn-Temper Copper Tubing: ASTM B 88, Type L

C. Annealed-Temper Copper Tubing: ASTM B 88, Type K.

2.3 STEEL PIPE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide steel pipe manufactured by one of the following:
   1. American Steel Pipe; Division of American Cast Iron Pipe Company.
   2. Central Steel and Wire Company.
   3. LaBarge Pipe and Steel Company.

B. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; welded and seamless, Grade B, and wall thickness as indicated in "Piping Applications" Article.

C. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125 and 250 as indicated in "Piping Applications" Article.

D. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300 as indicated in "Piping Applications" Article.

E. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in "Piping Applications" Article.

F. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Classes 25, 125, and 250; raised ground face, and bolt holes spot faced as indicated in "Piping Applications" Article.

G. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.

H. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
   1. Material Group: 1.1.
   2. End Connections: Butt welding.
   3. Facings: Raised face.

I. Grooved Mechanical-Joint Fittings and Couplings:
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. Anvil International, Inc.
      b. Central Sprinkler Company; a division of Tyco Fire & Building Products.

c. National Fittings, Inc.
d. Victaulic Company.

2. Joint Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47/A 47M, Grade 32510 malleable iron; ASTM A 53/A 53M, Type F, E, or S, Grade B fabricated steel; or ASTM A 106/A 106M, Grade B steel fittings with grooves or shoulders constructed to accept grooved-end couplings; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.
3. Couplings: Ductile- or malleable-iron housing and EPDM or nitrile gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

J. Steel Pipe Nipples: ASTM A 733, made of same materials and wall thicknesses as pipe in which they are installed.

2.4 JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness unless otherwise indicated.
a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.

F. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

G. Gasket Material: Thickness, material, and type suitable for fluid to be handled and working temperatures and pressures.

PART 3 EXECUTION

3.1 PIPING APPLICATIONS

A. Hot-water heating piping, aboveground, NPS 2 and smaller, shall be any of the following:
1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
2. Type L, drawn-temper copper tubing, wrought-copper fittings, and pressure-seal joints.
3. Schedule 40, Grade B, Type 96 steel pipe; Class 125, cast-iron fittings; cast-iron flanges and flange fittings; and threaded joints.

B. Hot-water heating piping, aboveground, NPS 2.5 and 3, shall be any of the following:
1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
2. Type L, drawn-temper copper tubing, wrought-copper fittings, and pressure-seal joints.
3. Schedule 40 steel pipe, wrought-steel fittings, wrought-cast or forged-steel flanges, flange fittings, and welded and flanged joints.

C. Hot-water heating piping, aboveground, NPS 4 and larger shall be the following:
1. Schedule 40 steel pipe, wrought-steel fittings, wrought-cast or forged-steel flanges, flange fittings, and welded and flanged joints.

D. Hot-water heating piping installed below ground and within slabs shall be the following:
1. Type K annealed-temper copper tubing:
a. Install underground tubing without joints.

E. Chilled-water piping, aboveground, NPS 2 and smaller shall be the following:
   1. Type L drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
   2. Type L, drawn-temper copper tubing, wrought-copper fittings, and pressure-seal joints.
   3. Schedule 40, Grade B, Type 96 steel pipe; Class 125, cast-iron fittings; cast-iron flanges and flange fittings; and threaded joints.

F. Chilled-water piping, aboveground, NPS 2.5 and 3 shall be the following:
   1. Type L drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
   2. Type L, drawn-temper copper tubing, wrought-copper fittings, and pressure-seal joints.
   3. Schedule 40 steel pipe; grooved, mechanical joint coupling and fittings; and grooved, mechanical joints.

G. Chilled-water piping, aboveground, NPS 4 and larger shall be the following:
   1. Schedule 40 steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.
   2. Schedule 40 steel pipe; grooved, mechanical joint coupling and fittings; and grooved, mechanical joints.

H. Makeup-water piping installed aboveground shall be the following:
   1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
   2. Type L, drawn-temper copper tubing, wrought-copper fittings, and pressure-seal joints.

I. Makeup-Water Piping Installed Belowground and within Slabs: Type K, annealed-temper copper tubing, wrought-copper fittings, and soldered joints. Use the fewest possible joints.

J. Condensate-Drain Piping: Type DWV, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.

K. Blow-down-Drain Piping: Same materials and joining methods as for piping specified for the service in which blow-down drain is installed.

L. Air-Vent Piping:
   1. Inlet: Same as service where installed with metal-to-plastic transition fittings for plastic piping systems according to the piping manufacturer's written instructions.
   2. Outlet: Type K, annealed-temper copper tubing with soldered or flared joints.

3.2 PIPING INSTALLATIONS

A. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

B. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

C. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

D. Install piping to permit valve servicing.

E. Install piping at indicated slopes.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Install piping to allow application of insulation.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

K. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

L. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

M. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

N. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

O. Install valves according to Section 230523 "General-Duty Valves for HVAC Piping."

P. Install unions in steel piping**,** adjacent to valves, at final connections of equipment, and elsewhere as indicated.

Q. Install flanges in piping, NPS 2-1/2 and larger, at final connections of equipment and elsewhere as indicated.

R. Install shutoff valve immediately upstream of each dielectric fitting.

S. Comply with requirements in Section 230516 "Expansion Fittings and Loops for HVAC Piping" for installation of expansion loops, expansion joints, anchors, and pipe alignment guides.

T. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for identifying piping.

U. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

V. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

W. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230518 "Escutcheons for HVAC Piping."

X. Install drain piping for outside air and relief/exhaust air plenums, and as indicated. Provide a waste fitting on the sheet metal plenum, and extend a turned-down elbow at a floor drain. Do not trap. Do not use plastic pipe.

3.3 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric nipples or flanges.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges.

D. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.4 HANGERS AND SUPPORTS

A. Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for hanger, support, and anchor devices. Comply with the following requirements for maximum spacing of supports.

B. Install the following pipe attachments:
   1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
   2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer.
   3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
   4. Spring hangers to support vertical runs.
   5. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
   6. On plastic pipe, install pads or cushions on bearing surfaces to prevent hanger from scratching pipe.

C. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:
   1. NPS 3/4: Maximum span, 7 feet.
   2. NPS 1: Maximum span, 7 feet.
   3. NPS 1-1/2: Maximum span, 9 feet.
   4. NPS 2: Maximum span, 10 feet.
   5. NPS 2-1/2: Maximum span, 11 feet.

6. NPS 3 and Larger: Maximum span, 12 feet.

D. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:

1. NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
2. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
3. NPS 1-1/4: Maximum span, 7 feet; minimum rod size, 3/8 inch.
4. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
5. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
6. NPS 2-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
7. NPS 3 and Larger: Maximum span, 10 feet; minimum rod size, 3/8 inch.

3.5 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8/A5.8M.

E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.6 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.

D. Install ports for pressure gages and thermometers at coil inlet and outlet connections. Comply with requirements in Section 230519 "Meters and Gages for HVAC Piping."

3.7 CHEMICAL TREATMENT

A. Refill any piping systems new, or existing, with chemicals matching type and volume.

B. Perform an analysis of makeup water to determine type and quantities of chemical treatment needed to keep system free of scale, corrosion, and fouling.

C. Fill system with fresh water and add liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products from piping. Circulate solution for a minimum of 24 hours, drain, clean strainer screens, and refill with fresh water.

D. Add initial chemical treatment and maintain water quality in ranges noted above for the first year of operation.

3.8 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:
   1. Leave joints, including welds, uninsulated and exposed for examination during test.
   2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
   3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
   4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
   5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:
   1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
   2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
   3. Isolate expansion tanks and determine that hydronic system is full of water.
   4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
   5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components and repeat hydrostatic test until there are no leaks.
   6. Prepare written report of testing.

C. Perform the following before operating the system:
   1. Open manual valves fully.
   2. Inspect pumps for proper rotation.
   3. Clean all strainers.
   4. Set makeup pressure-reducing valves for required system pressure.
   5. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
   6. Set temperature controls so all coils are calling for full flow.
   7. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
   8. Verify proper chemical treatment for each system.
   9. Verify lubrication of motors and bearings.

END OF SECTION

SECTION 233113
METAL DUCTS

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 specification section covers the general scope of work required for the demolition of the existing HVAC ductwork, piping, equipment and control systems and to provide continued HVAC services for remaining HVAC systems on this Terrace level on a temporary basis and also to maintain continuity and operation of the existing HVAC ductwork, piping, control, and equipment systems serving all levels and areas of the State Capitol building during all phases of construction. This section contains materials and equipment that may be necessary to make temporary connections of the systems for continued operation of the HVAC systems serving entire building.

B. This Section includes metal ducts for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 2-inces to plus 10-inches wg. Metal ducts include the following:

1. Rectangular ducts and fittings.
2. Single-wall round longitudinal-seam ducts and formed fittings.
3. Single-wall, round and flat oval spiral-seam ducts and formed fittings.

C. Related Sections include the following:

1. Refer to Division 7 Section "Joint Sealants" for fire-resistant sealants for use around duct penetrations and fire-smoke damper installations in fire-smoke rated floors, partitions, and walls.
2. Refer to Division 8 Section "Access Doors" for wall and ceiling-mounted access doors for access to concealed ducts.

1.3 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to:

1. AWS D1.1, “Structural Welding Code-Steel,” for hangers and supports.
2. AWS D1.2, “Structural Welding Code-Aluminum,” for aluminum supporting members.
3. AWS D9.1, “Sheet Metal Welding Code,” for duct joint and seam welding.

B. NFPA Compliance:

1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

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. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thickness, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653 and having G90 coating designation.
   1. Ducts shall have mill-phosphatized “Paint-Grip” finish for surfaces of ducts exposed to view that are scheduled for field painting.

C. Tie Rods: Galvanized steel, 3/8-inch minimum diameter. Rigid conduit, minimum 3 /4-inch, can be used in accordance with referenced standards.

2.3 SEALANT MATERIALS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
   1. Ductmate Industries, Incorporated (PROseal & FIBERseal)

B. Water-Based Joint and Seam Sealant: Flexible, adhesive sealant, resistant to UV light when cured, UL 723 listed, and complying with NFPA requirements for Class 1 ducts.

C. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type S, Grade NS, Class 25, use O.

D. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

2.4 FIRESTOPPING

A. Refer to Division 7 for fire-resistant sealants and fire-stopping materials for use around duct penetrations and fire damper installations in fire rated floors, partitions, and walls.

2.5 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
   1. Use powder-actuated concrete fasteners for standard-weight aggregate concrete’s or for slabs more than 4 inches thick.
   2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concrete’s or for slabs less than 4 inches thick.
   3. Exception: Do not use powder-actuated concrete fasteners in post-tensioned concrete slabs where the cable locations are not known. Fasteners shall not exceed 3/ 4-inch embedment.

B. Hanger Materials: Galvanized sheet steel or threaded steel rod.
   1. Hanger’s installed in Corrosive Atmospheres: Electro-galvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer prior to installation.
   2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.
   3. Use stainless steel straps or rods for stainless steel ducts exposed to view. Steel materials may be used for concealed ducts if painted with zinc-chromate primer prior to installation.
   4. Use aluminum straps or rods for aluminum steel ducts exposed to view. Steel materials may be used for concealed ducts if painted with zinc-chromate primer prior to installation.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36.
   1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates. Black steel shapes and plates may be used if painted with zinc-chromate primer prior to installation.
   2. Supports for Stainless-Steel Ducts: Stainless-steel support materials if ducts are exposed to view. Steel materials may be used for concealed ducts if painted with zinc-chromate primer prior to installation.
   3. Supports for Aluminum Ducts: Aluminum supports materials if ducts are exposed to view. Steel materials may be used for concealed ducts if contact surfaces are painted with zinc-chromate primer prior to installation.

2.6 DUCT FABRICATION-GENERAL

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," and with the requirements of this Section.

B. Comply with SMACNA's "Rectangular Industrial Duct Construction Standards" for acceptable materials, material thickness, and duct construction methods outside the scope of SMACNA's "HVAC Duct Construction Standards-Metal and Flexible."

C. Duct Pressure Classification: Construct duct systems for the following pressure classifications:
   1. Supply Air Ducts:
      a. Supply air ducts on variable-volume air systems between fan outlet and air terminal units: 4-inches water gage positive pressure.
      b. Supply air ducts on all constant volume air systems, and all supply ducts downstream of air terminal units on variable volume air systems: 2 inches water gage, positive pressure.
   2. Return and Relief Air Ducts: 2 inches water gage, negative pressure.
   3. Exhaust Air Ducts: 2 inches water gage, negative pressure.
   4. Laboratory Fume Hood Exhaust Air Ducts: 3 inches water gage, negative pressure.
   5. Other Ducts: 2 inches water gage positive or negative pressure.

D. Duct Sealing Classification: Provide SMACNA "Seal Class A" for all duct pressure classifications.
   1. Seal all transverse joints, longitudinal seams, and duct penetrations.
   2. Seal to achieve no visible or audible leaks.

E. Materials: All ducts shall be galvanized steel.

2.7 RECTANGULAR DUCT FABRICATION

A. General: Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible." Comply with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals, and with the requirements of this Section.
   1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
   2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
   3. Calculations: When duct construction is outside the scope of SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," provide calculations to demonstrate compliance with Duct Pressure Classification.

B. Transverse Joints:
   1. Prefabricated Slide-On Joints and Components:
      a. Manufacturers:
         1) Ductmate Industries, Inc.
         2) Elgen Manufacturing
         3) Nexus Inc.
         4) Ward Industries, Inc.
      b. Apply joints using manufacturer's "Duct Construction Standards" for material thickness, reinforcement size and spacing, and joint reinforcement. "Duct Construction Standards" must be based on the referenced SMACNA Standards. "Duct Construction Standards" shall be submitted as shop drawings, and must be available upon request at the Project Site.
      c. Slide-on joints must include the use of corners, bolts, cleats, and gaskets.
      d. Gaskets must be suitable for application at temperatures experienced at the Project Site.
   2. Formed-On Flanges:
      a. Manufacturers:
         1) Ductmate Industries Incorporated
         2) Elgen Manufacturing
         3) T.D.C.
         4) T.D.F.

b. Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Table 1-12. Formed-on flanges shall be constructed as T-25A (T.D.C.) and T-25B (T.D.F.) joints.
c. Formed-on flanges must include the use of corners, bolts, cleats, and gaskets.
d. Gaskets must be suitable for application at temperatures experienced at the Project Site.
e. Duct Size: Maximum 42-inches wide and up to 4-inches wg pressure class.
f. Duct Size: Maximum 60-inches wide and up to 4-inches wg pressure class.

3. Slips and Drives (Traditional):
   a. Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Tables 1-11 or 1-12s.

C. Longitudinal Seams: Pittsburgh-lock sealed with non-curing polymer sealant.

D. Internal Tie Rod Reinforcements: Do not use a transverse or intermediate reinforcement that requires the use of internal tie rods on ducts less than 96-inches wide.

E. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of non-braced panel area unless ducts are lined.

F. All-Welded Construction: Provide continuously welded longitudinal and transverse duct joints and seams on ducts as indicated.

G. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division 23 section "Ductwork Accessories" for accessory requirements.

H. Fabricate ductwork so as to be free from vibration, rattling, or "oil-canning" under all operating conditions.

I. Unless otherwise indicated, the net free area of the duct dimensions given on the Drawings shall be maintained. The duct dimensions shall be increased as necessary to compensate for liner thickness.

2.8 RECTANGULAR DUCT FITTINGS

A. General: Fabricate elbows, transitions, offsets, branch connections, and other duct construction in accordance with SMACNA "HVAC Metal Duct Construction Standards-Metal and Flexible," Figures 2-1 through 2-10.

B. Elbows and Divided Flow Fittings: Fabricate fittings with a centerline radius equal to 1.5 times the associated duct widths up to 28 inches wide, and 1.0 times the duct width for ducts 30 inches wide and wider. Figure 2-2; Type RE 1 radius elbow.
   1. Where elbows with a shorter radius are necessary, fabricate elbows with a 4-inch throat radius, full radius heel, and with short radius vanes. Figure 2-2, Type RE-3. Fabricate short radius vanes according to Appendix pages A.41, A.42 and A.43.
   2. Do not use square elbows, except where indicated on the Drawings. Where used, fabricate square elbow with single-wall turning vanes.

C. Transitions and Offsets: Limit concentric transitions to 45 degrees for diverging, and 60 degrees for converging; limit single-sided transitions to 22.5 degrees for diverging and 30 degrees for converging. Limit angled offsets to a maximum of 30 degrees.

D. Branch Connections: Fabricate branch connections according to Figure 2-6 using clinch lock joints and 45-degree entry.

2.9 ROUND AND FLAT-OVAL DUCT FABRICATION

A. Fabricate ducts according to SMACNA's "HVAC Duct Construction Standards-Metal and Flexible," Tables 3-2 and 3-3.

B. Duct Pressure Classification and Duct Sealing Classification: As indicated in previous Article "Duct Fabrication, General."

C. Round Longitudinal Lock-Seam Ducts 14-inches and smaller:
   1. Manufacturers:
      a. Ductmate Industries, Incorporated

2. Fabricate round ducts with longitudinal grooved “Green Seam” snap lock pipe. Figure 3-1, Type RL-5.
3. Longitudinal snaplock seams may be used for round duct diameters 14-inches and smaller for 2-Inch Duct Pressure Classifications. Figure 3-1, Type RL-6, RL-7. RL-78.

D. Round and Flat Oval, Longitudinal and Spiral-Lock-Seam Ducts 16-inches and larger:
1. Manufacturers:
   a. McGill AirFlow Corporation.
   b. Semco Incorporated.
   c. Sheetmetal Connectors Incorporated.
2. Fabricate round ducts with spiral lockseam. Figure 3-1, Type RL-1.
3. Fabricate round ducts with longitudinal grooved seam. Figure 3-1, Type RL-5.
4. Provide continuous butt-welded longitudinal seams on ducts larger than 72-inches, and where otherwise indicated. Figure 3-1, Type RL-4.

E. Transverse Duct Joints.
1. Manufacturers:
   a. Ductmate Industries Incorporated.
   b. Elgen Manufacturing
   c. Semco Incorporated.
2. Duct up to 20-Inches Diameter: Interior, center-beaded slip coupling. Figure 3-2, Type TR-1.
   a. Beaded crimp joints may be used for round duct diameters 14-inches and smaller for 2-Inch Duct Pressure Classifications. Figure 3-2, Type TR-5.
   b. Prefabricated self sealing gasketed coupler: Ductmate “Bullet Band”.
3. Ducts 21 to 72-Inches Diameter: Prefabricated three-piece, gasketed, flanged joint consisting of two inner ring flanges with sealant and one external closure band with gasket. Ductmate “Spiralmate” or equivalent.
   a. Prefabricated flanged joint consisting of two external flanges with sealant and gasket may be used for concealed ducts. Ductmate “Econoflange,” Semco “Accuflange,” or equivalent.
   b. Prefabricated self sealing gasketed coupler: Ductmate “Bullet Band”.
4. Ducts larger than 72-Inches Diameter: Companion angle flanged joints with gasket, sealed before and after fastening. Figure 3-2, Type RT-2.
   a. Prefabricated self sealing gasketed coupler: Ductmate “Bullet Band”.
5. Joints shall be made with mechanical fasteners (sheet metal screws, blind rivets, welds, bolts). Use sealer before and after fastening.
6. Traverse Duct Joints on exposed ducts.
   a. Prefabricated self sealing gasketed coupler: Ductmate “Bullet Band”.

F. Unless otherwise indicated, the net free area of the duct dimensions given on the Drawings shall be maintained. The duct dimensions shall be increased as necessary to compensate for liner thickness

2.10 ROUND AND FLAT OVAL DUCT FITTING FABRICATION

A. Manufacturers:
   a. Ductmate Industries, Inc.
   b. Elgen Manufacturing
   c. McGill AirFlow Corporation.
   d. Semco Incorporated.
   e. Sheetmetal Connectors Incorporated. (www.smcduct.com)

B. General: Fabricate elbows, transitions, offsets, branch connections, and other duct construction in accordance with SMACNA "HVAC Metal Duct Construction Standards-Metal and Flexible," Figures 3-3 through 3-5.
1. Duct fittings shall be fabricated from metal thickness not less than required for longitudinal-seam straight duct in Tables 3-2 and 3-3.

C. Round Duct Takeoffs from Rectangular Ducts: Fabricate takeoffs with clinch-lock or spin-in conical connectors with volume dampers.
1. Straight connectors may be used for 2-inch Duct Pressure Classification.

D. Elbows: Fabricate with welded seam, die-formed or segmented construction with bend radius 1.5 times the elbow diameter.
   1. Die-Formed Elbows (8-Inches and smaller): Fabricate elbows with two-piece, die-formed construction.
   2. Segmented Elbows (Larger than 8-Inches): Fabricate elbows with multiple segments or gores with number of pieces as follows:
      a. 90 degrees - 5 pieces.
      b. 60 degrees - 4 pieces.
      c. 45 degrees - 3 pieces.
      d. 30 degrees - 2 pieces.
   3. 90 degrees, Two-piece Mitered Elbows: Use only where space restrictions do not permit the use of radius elbows. Fabricate elbows with single thickness turning vanes.
   4. Adjustable Mitered Elbow (14-Inches and Smaller): Adjustable seam, mitered elbows (4-piece 90 degree, 3-piece 45 degree) with bend radius 0.6 times the elbow diameter may be used for 2-inch Duct Pressure Classifications. Joints shall be sealed after installation.

E. Laterals, Tees and Wyes: Fabricate with welded seam construction with conical branch taps with no excess material projecting from body into branch tap entrance.
   1. Straight branch taps may be used for 2-inch Duct Pressure Classification.
   2. Fittings with riveted or bonded joints may be used for duct diameters 16-inches and smaller for 2-inch Duct Pressure Classification. Joints shall be sealed after installation.

F. Diverging-Flow Fittings: Fabricate with welded seam with a reduced entrance to branch taps with no excess material projecting from the body onto branch tap entrance.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," and the requirements of this Section.

B. Install ducts according to SMACNA's “Rectangular Industrial Duct Construction Standards” when duct construction is outside the scope of SMACNA's "HVAC Duct Construction Standards-Metal and Flexible."

C. Construct and install each duct system according to the Duct Pressure Classification and Duct Sealing Classification indicated in previous Article “Duct Fabrication, General.”

D. Install round and flat-oval ducts in lengths not less than 12 feet unless interrupted by fittings.

E. Install fabricated fittings for changes in directions, size, and shape and for connections.

F. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of 3 screws in each coupling.

G. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.

H. Provide offset fittings where necessary to avoid structural interference's and in coordination with existing conditions and the Work of other trades.

I. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Provide a minimum clearance of 1 inch, plus an allowance for insulation thickness to other elements.

J. Install ducts as high as possible, unless otherwise indicated. Where overhead structure permits, route ducts between structural elements.

K. Conceal ducts from view in finished spaces by locating within mechanical shafts, within hollow construction, or above suspended ceilings. Do not encase horizontal runs in solid partitions unless specifically indicated.

L. Where exposed to view; install ducts as high as possible, unless otherwise indicated. Protect exposed duct from physical damage. Repair scratches, dents, cuts, and other physical imperfections. Remove stickers and markers. Prepare for field painting. Grind and polish exposed welds so no roughness shows and contours of welded surfaces match adjacent contours.

M. Install insulated ducts with 1-inch clearance outside of insulation.

N. Coordinate the duct layout with suspended ceiling, fire and smoke-control dampers, piping, lighting layouts and conduits, and the Work of other trades.

O. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same metal thickness as duct. Overlap opening on four sides by at least 1-1/2 inches.

P. One hour rated fire barrier penetrations: (Where the building code allows fire barrier penetrations without fire dampers) Provide angles on both sides of the wall penetrations conforming to the requirements of wall system approval.

Q. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and fire stopping sealant.
   1. Fire and smoke dampers are specified in Division 23 Section "Duct Accessories."
   2. Fire stopping materials and installation methods are specified in Division 7 Section "Fire stopping."

R. Protect duct interiors from elements and foreign materials until building is enclosed. Refer to SMACNA's "Duct Cleanliness for New Construction."

3.2 SEAM AND JOINT SEALING

A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.

B. Duct Sealing Classification: Provide SMACNA "Seal Class A" for all duct pressure classifications.
   1. Seal all transverse joints, longitudinal joints, and duct penetrations.
   2. Seal to achieve no visible or audible leaks.

C. Seal externally insulated ducts before insulation is applied.

D. Seal exposed joints internally during installation. Do not use external sealant on exposed ducts.

3.3 HANGING AND SUPPORTING

A. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.

B. Support vertical ducts at maximum intervals of 16 feet and at each floor.

C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

D. Install concrete inserts before placing concrete.

E. Fastener System Installation:
   1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs greater than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
   2. Install mechanical fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured.
   3. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

3.4 CONNECTIONS

A. Make connections to equipment with flexible connectors according to Division 23 Section "Duct Accessories."

B. For branch connections comply with SMACNA's "HVAC Duct Construction Standards-Metal and Flexible," Figures 2-5 and 2-6.

C. For inlet and outlet connections comply with SMACNA's "HVAC Duct Construction Standards-Metal and Flexible," Figures 2-14 and 2-15.

D. For equipment connections comply with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible," Figures 2-17.

3.5 FIELD QUALITY CONTROL

A. Perform field tests and inspections according to SMACNA's "HVAC Air Duct Leakage Test Manual" and prepare test reports.

B. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.

C. Conduct tests at static pressures equal to Duct Pressure Classification designated static pressures.

D. Conduct tests in the presence of the Architect, or authorized representative. Give 7 day's advanced notice for testing. Prepare test reports.

E. Remake leaking joints and retest until leakage is equal to or less than maximum allowable.

F. Leakage Tests:

1. Leak test each section of duct with a Duct Pressure Classification greater than 2-inches wg.
2. Leak test each section of duct within a concealed shaft.

G. Maximum Allowable Leakage: Comply with requirements for Leakage Class 3 for ducts with a Duct Pressure Classification greater than 2-inches, and for Leakage Class 6 for ducts with duct pressure classification 2-inches or less.

a. For a duct section with 4-inch Duct Pressure Classification or greater and Duct Leakage Class 3, leakage shall not exceed 7.5 CFM per 100 sq. ft. of duct surface area.
b. For a duct section with a 2-inch Duct Pressure Classification and Duct Leakage Class 6, leakage shall not exceed 9.5 CFM per 100-sq. ft. of duct surface area.
c. For positive pressure exhaust ducts, leakage shall be zero at 4.0 inches wg.

3.6 TEMPORARY USE OF AIR HANDLING SYSTEMS

A. Refer to Division 1 Section 01510 "Temporary Utilities" for additional requirements.

B. Until the permanent air handling systems are used, duct openings shall have closures to preclude the entry of construction dirt and debris into the duct system and equipment.

C. If the permanent air handling systems are used for temporary heating or ventilating prior to completion of finishing operations, the supply air systems shall be operated with 100 percent outside air (no recirculation air) with pre-filters and final filters in place and maintained.

1. Operation of air handling systems may not be possible during extreme outside air conditions.
2. The return air and exhaust air systems shall not be used. The duct openings on these systems shall have permanent closures.

D. When the building is substantially complete, the permanent air handling systems may be utilized with return air with air filters in place. Extra-ordinary measures shall be taken to prevent dirt and/or moisture from entering the duct systems.

1. Filters: Maintain clean filters in place. Install new permanent filters prior to Owner occupancy of the Project.
2. Equipment: Maintain fans and equipment until Owner occupancy of the Project.

E. Air handling system ducts shall be vacuum cleaned, and equipment surfaces washed as may be necessary to restore the systems to new condition prior to final acceptance by the Owner.

END OF SECTION

SECTION 260500
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Electrical equipment coordination and installation.
   2. Common electrical installation requirements.
   3. Demolition.
   4. Cutting and patching for electrical construction.
   5. Touchup painting.
   6. Disposition of existing materials and equipment.
   7. Electric Service Outage and Energizations.

1.3 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.

C. Comply with Federal, State, and City Code requirements.

D. All materials shall meet the standards of the following institutes where applicable:
   1. National Fire Protection Association (NFPA)
   2. American Society of Testing Materials (ASTM)
   3. American National Standards Institute (ANSI)
   4. National electrical Manufacturer's Association (NEMA)
   5. Institute of Electrical and Electronic Engineers (IEEE)

1.4 COORDINATION

A. Common Work Results
   1. Many components of the building are historic. Preservation of historic materials is of high priority. All removal and installation of systems shall be coordinated with the Architectural drawings. Diligent effort is to be used when coordinating any removal or installation of systems. The contractor shall inform the Architect and Engineer of impact on any historical material that is not noted on the architectural drawings.
   2. Existing systems may be concealed within walls and vertical chases that are noted for demolition. The Contractor shall be responsible to identify the locations of all systems within walls or shafts and to protect those systems that serve occupied spaces in the building at the Terrace level and all upper floors. The Contractor shall inform the Architect and Engineer of impact to building systems serving occupied spaces.

B. The contractor shall coordinate all demolition and temporary power requirements in order to maintain power to power distribution points which serve other areas and levels of the building keeping the other areas and levels operation during construction.

C. It desired that the installation of new mechanical ducts and major electrical raceways are routed under the Terrace level slab. Routing temporary power and systems equipment should take into account under slab routing and slab removal in the Terrace level.

D. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

E. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

F. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Section 083100 "Access Doors and Panels."

G. Coordinate sleeve selection and application with selection and application of firestopping specified in Section 078400 "Firestopping."

H. 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.

1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

I. 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.

1.5 DRAWINGS

A. The general notes on drawings discuss the extent of the demolition of system devices. System head end equipment and other major equipment associated with the systems are identified on the drawings, not the devices; example receptacle outlet and data outlet not shown. Outlet devices have been identified on plan where existing plans were available with reasonable accuracy. All devices in the terrace level are to be removed. The intention is for the design assist contractor to observe the device quantities and provide estimates on a square foot basis or other approved method. The owner is responsible for removing any equipment supported by any of these systems.

Alpha Media is onboard to assist with Senate media design and any temporary conditions.

B. The drawings indicate the arrangements of electrical equipment. Review architectural drawings and details for door swings, cabinets, counters and built-in equipment; conditions indicated on architectural plans shall govern. Coordinate installation of new and temporary electrical equipment with structural system and mechanical equipment and access thereto. Coordinate installation of recessed electrical equipment with concealed ductwork and piping, and wall thickness. All devices, raceway, and electrical equipment in finished and/or public spaces shall be recessed or concealed unless otherwise noted.

C. Intermediate temporary power and systems conditions are not called out in the drawings. It shall be the responsibility of the Contractor to coordinate such conditions.

D. Do not scale drawings. Obtain dimensions for layout of equipment from Architectural plans and details unless indicated on Electrical plans.

E. Bring all discrepancies shown on different drawings, between drawings and specifications or between documents and field conditions to the immediate attention of the Architect.

F. Equipment layout is based on one manufacturer's product or from composite dimensions from multiple manufacturers. Where equipment selected for use on the job differs from layout, coordinate space requirements and connection arrangements.

1.6 EQUIPMENT REQUIRING ELECTRICAL SERVICE

A. Review all specification sections and drawings for equipment requiring electrical service. Provide service to and make connections to all such equipment requiring electrical service.

B. Incidental items not indicated on Drawing or mentioned in Specifications but that can legitimately and reasonably be inferred to belong to the Work or be necessary in good practice to provide complete system, shall be furnished and installed though not itemized here in detail. This includes all means of temporary equipment, feeders, and distribution equipment required to maintain systems operation through the building during construction.

1.7 MECHANICAL SYSTEMS INTERFACE

A. All control wiring for plumbing, heating, ventilating and air conditioning systems shall be installed under Division 23. Review Division 23 specifications and shop drawings for control systems to assure compatibility between equipment furnished under Division 23 and wiring furnished under Division 26.

B. Motor controllers (starters) shall be furnished and installed under Division 26, unless specified to be furnished as an integral component of the equipment. Provide the number and type of auxiliary contacts necessary to interlock the equipment and provide the specified control sequence.

C. All electric heating equipment shall be provided and installed under Division 23 - HEATING, VENTILATING AND AIR CONDITIONING. Power wiring to all electric heating equipment shall be provided under Division 26 of these specifications.

1.8 SITE INVESTIGATION

A. To the extent possible, familiarize yourself with the site requirements of the project,, visit the site of the work to become aware of existing conditions which may affect the cost of the project. Where work under this project requires extension, relocation, reconnections or modifications to existing equipment or systems, the existing equipment or systems shall be restored to their original condition, with the exception of the work under this contract, before the completion of this project. Existing systems and conditions which are not detailed on the drawings must still be restored to their original condition.

B. Many existing conditions may be concealed within walls and vertical chases that are unseen. If investigation of these spaces is desired bring them to the attention of the Architect.

PART 3 EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way:
   1. Give to piping systems installed at a required slope.
   2. Temporary (above slab/overhead) and new mechanical duct work (below slab).

F. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

3.2 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Section 078400 "Firestopping."

3.3 DEMOLITION

A. The facility consists of several decades of new and abandoned raceways for electrical systems. The contractor should plan on demolishing all overhead raceways within the Terrace level unless it Is necessary to maintain temporary power to other areas of the building Verify if raceways are required to remain operational for temporary service during construction before demolishing. Once phasing of the project has allowed for temporary power to be removed, all remaining overhead raceways should be removed

B. 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.

C. Reroute circuits as required to serve equipment not in the demolition area.

D. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.

E. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches (50 mm) below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.

F. Abandoned Work in Historic Plaster ceilings: Where bare and insulated wiring is located in plaster ceiling, it shall be removed unless potential damage to the ceiling. Otherwise cut wiring flush with the plaster and provide necessary coving to ensure the wiring doesn't interfere or damage new wiring and cable.

G. Remove demolished material from Project site.

H. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

I. Remove devices on wall or ceilings being removed. Coordinate with other divisions.

J. Assume that all existing equipment and fixtures indicated to be reused are in good working condition and can be installed without repairs. Notify the Architect of items found to be in need of repair or in unusable condition for direction or decision. Repair any damage to equipment caused in removal or handling

K. Fixtures and other equipment removed and to be-used shall be cleaned before reinstallation. Provide new lamps for reused light fixtures.

L. Added Circuits: All loads and circuits added to existing panelboards shall be balanced between phases. On existing panelboards where circuits are changed, replace panel directories with new typed directories.

M. All material and equipment which is noted or required by the owner to be salvaged and which is not scheduled to be reused or relocated shall be carefully removed and shall be delivered to the owner and stored where directed on the site.

N. Remove all abandoned low voltage wiring. All wiring disconnected on one or both ends is considered abandoned unless tagged and labeled "future" or "spare". Verify with Owner any cabling connected on both ends is still in use prior to removal.

3.4 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. Many areas of the building are considered historic. Diligent effort is to be used when coordinating any removal or installation of electrical systems. Preservation of these historic spaces is of high priority. All removal and installation of systems shall be coordinated with the Architectural drawings. If any portion of the building and impact of construction is questionable, the contractor shall inform the Architect and Engineer of the issue as well as any proposed solutions.

C. All repair and refinishing materials and other surfaces shall be coordinated with the Construction Coordinator and Architect. The Construction Coordinator shall be responsible for assigning a qualified tradesman to repair and refinish all surfaces and apply necessary fire stopping.

D. Where cutting and channeling through historic plaster ceilings is required, it shall be coordinated with the General contractor. This work is to be performed by a skilled tradesman.

3.5 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:
   1. Fire stopping.
   2. Electrical demolition.
   3. Cutting and patching for electrical construction.
   4. Touchup painting.

3.6 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified in Section 099000"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.

3.7 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.

3.8 DISPOSITION OF EXISTING BALLASTS CONTAINING PCBS

A. Environmental Protection Agency (EPA) Regulations [and Minnesota Pollution Control Agency (MPCA) Rules] require controlled disposal of fluorescent light ballasts containing polychlorinated biphenyls (PCBs) when removed from service. The ballasts involved were generally manufactured between 1950 and 1979.

B. Provide suitable ballast collection containers at the project site. Check the ballasts in all fluorescent fixtures removed from service under this contract. Some ballasts may be labeled to indicate whether they do or do not contain PCBs. Remove from the fixtures all ballasts known or assumed to contain PCBs and place them in the designated ballast collection container and arrange for the disposal of the ballasts off the site in manner approved by the EPA [and MPCA].

C. Bear all cost for ballast recycling.

3.9 DISPOSITION OF EXISTING FLUORESCENT LAMPS

A. EPA Regulations and Minnesota Pollution Control Agency (MPCA) rules require the controlled disposal of fluorescent lamps.

B. Remove all existing fluorescent lamps and package to prevent breakage according to EPA Regulations. Ship the lamps to a licensed lamp recycling facility with an approved material handler.

C. Furnish the Owner with a Certificate of Disposal for these lamps, indicating the number of lamps, time and location of disposal.

D. Bear all cost for lamp recycling.

3.10 ELECTRIC SERVICE OUTAGE AND ENERGIZATIONS

A. Owner Approval: Electric service outages or energizations required shall be approved by the Owner before outages or energization. Outages shall be scheduled at the convenience of the Owner.

B. Written Request: Requests for outages and energizations shall be submitted in writing to the Owner for approval at the earliest possible date and in no case later than 14 business days prior to the outage and/or energization.

C. Cancellation: The Owner reserves the right to cancel or change the scheduling of any outage up to 24 hours before its approved starting time. There shall be no additional cost to Owner for scheduled outages, or for outages re-scheduled at the Owner's request where at least 24 hours notice has been given by the Owner.

D. Schedules (Method of Procedure): A minimum of two (2) weeks before the first outage, submit a schedule of proposed sequence of all the electric feeder and switchboard outages and energizations. This schedule shall show construction energizations and shall include any weekend or overnight work. The schedule shall list the work to be completed during and between each outage.

E. Minimize all outages on the Owner's electrical system and employ sufficient workmen so that work will be carried on concurrently at more than one location, when necessary.

F. Before submitting any energization and/or outage requests, provide the owner with evidence that the following requirements have been met:
   1. All required equipment and material is on the job site. All related installations that can be worked on without an energization and/or outage are complete, tested, available for inspection, and ready for service.
   2. All shop drawings, test reports, installation data, and operational data have been submitted and approved.
   3. The energizing and outage schedule has been submitted and approved.

G. Similar outage procedures shall be followed for telecommunications and other services to the facility.

3.11 PRIMARY SERVICE PROCEDURES

A. During the energization and/or outage follow established switching procedures with Plant Management. Coordinate with the Owners operating personnel for switching of campus medium voltage distribution and generator distribution. Contact Howard Hipakka Electrical Supervisor, 651-201-2347.

B. Service disconnecting means and primary switches shall be left open and tagged in the name of a person to be designated by the Owner. In no case shall these cards be removed or switches closed without that person's approval.

C. Operation of each primary switch installed under the contract shall be under Division 26. All switching of Owner system to perform the outage shall be performed by Division 26.

D. At the time of energizing each primary feeder and/or equipment, the Contractor will be prepared to handle any situation that may arise from a cable or equipment failure or other faults on the system. If a failure or a fault occur, check out and place the system in proper operation with the required personnel and equipment.

E. All primary and secondary temporary connections will be performed under Division 26.

END OF SECTION

SECTION 270500
COMMON WORK RESULTS FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Quality Assurance.
   2. Contractor Qualifications.
   3. Permits, Supervision, and Warrantee.
   4. Communications equipment coordination and installation.
   5. Common communications installation requirements.
   6. Demolition.
   7. Cutting and patching for electrical construction.
   8. Touchup painting.
   9. Disposition of existing materials and equipment.
   10. Communication Service Outage and Energizations.

1.3 QUALITY ASSURANCE

A. Technology work shall be in accordance with the following codes and agencies. Refer to the most recent adopted version.
   1. National Electrical Code (ANSI/NFPA 70).
   2. National Electrical Safety Code (ANSI C-2).
   3. Life Safety Code (NFPA 101).
   4. Occupation Safety and Health Administration (OSHA).
   5. State and Municipal ordinances.
   6. Americans with Disabilities Act (ADA).
   7. International Building Code (IBC).

B. Material and Installation Standards: Provide new material and conform to the standards where such have been established for the particular material and installation in question. Publications and Standards of the organization listed below are applicable to materials and installation specified herein. Refer to the most recent adopted version.
   1. American Society for Testing and Materials (ASTM)
   2. Underwriters' Laboratories, Inc. (UL)
   3. National Electrical Manufacturer Association (NEMA)
   4. Insulated Cable Engineers Association (ICEA)
   5. Institute of Electrical and Electronic Engineers (IEEE)
   6. National Fire Protection Association (NFPA)
   7. American National Standards Institute (ANSI)
   8. Electrical Testing Laboratory (ETL)
   9. Edison Electric Institute (EEI)
   10. National Board of Fire Underwriters (NBFU)
   11. International Standards Organization (ISO)
   12. Federal Communications Commission (FCC)
   13. ANSI/TIA/EIA-526 – Standard Test Procedures for Fiber Optic Systems.
   14. TIA/EIA-526-7 – Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant.
   15. TIA/EIA-526-14-B – Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant; IEC 61280-4-1 edition 2, Fiber-Optic Communications Subsystem Test Procedure-Part 4-1: Installed cable plant-Multimode attenuation measurement.
   16. ANSI/TIA-568-C.0 – Generic Telecommunications Cabling for Customer Premises.

17. ANSI/TIA-568-C.1 – Commercial Building Telecommunications Cabling Standard.
18. ANSI/TIA-568-C.2 – Balanced Twisted-Pair Telecommunications Cabling and Components Standards.
19. ANSI/TIA-568-C.3 – Optical Fiber Cabling Components Standard.
20. ANSI/TIA-568-C.4 – Broadband Coaxial Cabling and Components Standard.
21. ANSI/TIA/EIA-569-C – Telecommunications Pathways and Spaces.
22. ANSI/TIA/EIA-570-C – Residential Telecommunications Infrastructure Standard.
23. ANSI/TIA/EIA-598-C – Optical Fiber Cable Color Coding.
24. ANSI/TIA/EIA-606-B – Administration Standard for the Commercial Telecommunications Infrastructure.
25. ANSI/TIA-607-B – Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
26. ANSI/TIA/EIA-758-B – Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
27. ANSI/TIA-942-A – Telecommunications Infrastructure Standard for Data Centers.
28. ANSI/NECA/BICSI 568 Standard for Installing Commercial Building Telecommunications Cabling.

C. Installation methodology. Conform to the publications where such have been established for the particular installation in question. Publications of the organization listed below are applicable to the installation specified herein. Refer to the most recent adopted version.
   1. BICSI – Telecommunications Distribution Methods Manual.
   2. BICSI – Customer Owned Outside Plant Design Manual.

1.4 CONTRACTOR QUALIFICATIONS

A. A minimum of 5 years' experience in the installation and service of voice/data cabling communications systems on projects of comparable size and scope.

B. A minimum of 5 years' experience in the installation and service of Outside Plant Cabling Systems on projects of comparable size and scope.

C. Registered with the equipment manufacturer(s) as franchised reseller of registered systems and serve as the installing contractor and ongoing registered service provider.

D. Registered Communications Distribution Designer (RCDD) certified by the Building Industry Consulting Service International (BICSI).

E. Installation personnel trained in the proper installation of extended performance data and voice cable, prior to installation, by outside training course or in-house training program.

F. Installation personnel trained in the proper installation of outside plant cabling, prior to installation, by outside training course or in-house training program.

G. Alarm and Communications License furnished by the Minnesota State Board of Electricity.

1.5 PERMITS

A. Secure and pay for licenses and permits required by the State and Municipality before work is started. Observe requirements of permits and licenses.

B. Schedule inspection of work and installations by the authority having jurisdiction.

1.6 SUPERVISION

A. Installations shall be made by persons licensed and skilled in the trade and shall be done under the supervision of a BICSI Registered Communications Distribution Designer (RCDD).

1.7 WARRANTY

A. Refer to the General Conditions and individual sections, for warranty of work under Division 27.

B. Warrant to the owner and Architect the following:
   1. Materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents.

2. The Work will be free from defects not inherent in the quality required or permitted.
3. The Work will conform to the requirements of the Contract Documents.
4. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective.
5. Warranty excludes remedy for damage or defect caused by abuse, modifications not executed under this Contract, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage.
6. If required by the Architect, furnish satisfactory evidence as to the kind and quality of materials and equipment.

1.8 COORDINATION

A. Common Work Results
   1. Many components of the building are historic. Preservation of historic materials is of high priority. All removal and installation of systems shall be coordinated with the Architectural drawings. Diligent effort is to be used when coordinating any removal or installation of systems. The contractor shall inform the Architect and Engineer of impact on any historical material that is not noted on the architectural drawings.
   2. Existing systems may be concealed within walls and vertical chases that are noted for demolition. The Contractor shall be responsible to identify the locations of all systems within walls or shafts and to protect those systems that serve occupied spaces in the building at the Terrace level and all upper floors. The Contractor shall inform the Architect and Engineer of impact to building systems serving occupied spaces.

B. The contractor shall coordinate all demolition and temporary communications systems requirements in order to maintain communications connections which serve other areas and levels of the building keeping the other areas and levels operation during construction.

C. It desired that the installation of new mechanical ducts and major electrical raceways are routed under the Terrace level slab. Routing temporary communications systems cabling/equipment should take into account under slab routing and slab removal in the Terrace level.

D. Coordinate arrangement, mounting, and support of communications equipment:
   1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
   2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
   3. To allow right of way for piping and conduit installed at required slope.
   4. So connecting pathways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

E. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

F. Coordinate location of access panels and doors for communications items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Section 083100 "Access Doors and Panels."

G. Coordinate chases, slots, inserts, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.
   1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

H. Sequence, coordinate, and integrate installing communications materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

I. Coordinate communication service connections to components furnished by utility companies.
   1. Coordinate installation and connection of exterior underground and overhead utilities and services.

J. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

Document results of said testing.

1.9 DRAWINGS

A. The general notes on drawings discuss the extent of the demolition of system devices. System head end equipment and other major equipment associated with the systems are identified on the drawings, not the devices; example data outlet not shown. Outlet devices have been identified on plan where existing plans were available with reasonable accuracy. All devices in the terrace level are to be removed. The intention is for the design assist contractor to observe the device quantities and provide estimates on a square foot basis or other approved method. The owner is responsible for removing any equipment supported by any of these systems.

B. Drawings Sheets E110A and E110B in WP#1 indicate the termination locations and approximate major routes of the existing Campus fiber optic cabling. The existing Campus fiber optic cabling will need to be relocated in a future Work Package.

C. The drawings indicate the arrangements of communications equipment. Review architectural drawings and details for door swings, cabinets, counters and built-in equipment; conditions indicated on architectural plans shall govern. Coordinate installation of new and temporary communications cabling and equipment with structural system and mechanical equipment and access thereto. Coordinate installation of recessed communications equipment with concealed ductwork and piping, and wall thickness. All devices, raceway, and communications equipment in finished and/or public spaces shall be recessed or concealed unless otherwise noted.

D. Intermediate temporary communications systems cabling and equipment conditions are not called out in the drawings. It shall be the responsibility of the Contractor to coordinate such conditions.

E. Do not scale drawings. Obtain dimensions for layout of equipment from Architectural plans and details unless indicated on Electrical plans.

F. Bring all discrepancies shown on different drawings, between drawings and specifications or between documents and field conditions to the immediate attention of the Architect.

G. Equipment layout is based on one manufacturer's product or from composite dimensions from multiple manufacturers. Where equipment selected for use on the job differs from layout, coordinate space requirements and connection arrangements.

1.10 SUBMITTALS

A. Pre-Construction
   1. List of Materials and Subcontractors:
      a. Refer to Division 1 for submittal requirements.
   2. Schedule of Values:
      a. Refer to Division 1 for submittal requirements.
      b. Provide a schedule of values for the technology contract work specified under Division 27. Include separate labor and material itemization for each line item requested.
      c. Provide the following line items as a minimum level of itemization:
         1) Mounting elements in Telecommunications Rooms, Equipment Rooms and Entrance Facilities.
         2) Copper Backbone Cabling.
         3) Fiber Backbone Cabling.
         4) Horizontal Cabling.
         5) Outside Plant Cabling.
      d. The itemized schedule of values, above, will be used to determine project completion and progress for payment requests, including overhead and profit for each itemization. Schedule of values must be submitted and approved prior to first pay request.
   3. Shop Drawings and Product Data:
      a. Submit for review, shop drawings and product data of materials and equipment to be incorporated in the work. Support submittals with descriptive material, catalog cut sheets, diagrams, performance curves, and charts published by the manufacturer to show conformance to specification and drawing requirements. Provide complete electrical characteristics for equipment.

b. Refer to the individual sections for identified equipment and materials for which submittals are required.
c. Refer to the SHOP DRAWINGS, PRODUCT DATA AND SAMPLES section for required procedures.
d. Neatly bound in a three ring or comb type binder, with protective covers. Identify the project, the site, system, date and vendor name on the cover
e. Consisting of, but not be limited to the following items:
    1) Title sheet showing the Contractor's name, address, phone number, BICSI RCDD registration stamp with signature and date submitted. Provide clear area on the title sheet for shop drawing review stamps.
    2) Material list showing quantity, manufacturer and description of each item being furnished.
f. Submit documents as a single package per site.
g. Submit within 2 weeks after award of contract.
h. The Contractor must neither order equipment nor proceed with installation until the Architect approves shop drawings.

B. Close-Out
1. Record Documents:
    a. Refer to Division 1 for record documents and related submittals.
2. Operation and Maintenance Data and Instructions
    a. Refer to Division 1 for detail requirements.
    b. Printed Material: Provide required printed material for binding in operation and maintenance manuals.
    c. Instructions of Owner Personnel:
        1) Schedule training with owner.
        2) Notify architect 2 weeks prior to training.
        3) Provide a competent representative to instruct Owner's designated personnel in systems under this division of the specifications before final inspection, as designated by the Architect. For equipment requiring seasonal operation, perform instructions for other season within six months unless requested otherwise.
        4) Use operation and maintenance manuals as basis of instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
        5) Refer to the individual section for training specific to each system.
        6) Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.
        7) The owner reserves the right to videotape training.
    d. Document extent of training to include dates, times, location and attendance roster. Submit for inclusion in Operations and Maintenance Manual.

C. Refer to Section 018113 Sustainable Design Requirements for requirements of sealants, primers, paints, adhesives, caulk, aerosols, and coatings.

1.11 SITE INVESTIGATION

A. Prior to submitting bids of the project, visit the site of the work to become aware of existing conditions which may affect the cost of the project. Where work under this project requires extension, relocation, reconnections or modifications to existing equipment or systems, the existing equipment or systems shall be restored to their original condition, with the exception of the work under this contract, before the completion of this project. Existing systems and conditions which are not detailed on the drawings must still be restored to their original condition.

B. Many existing conditions may be concealed within walls and vertical chases that are unseen. If investigation of these spaces is desired bring them to the attention of the Architect.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.0 COMMON REQUIREMENTS FOR COMMUNICATIONS INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both communications equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way:
   1. Give to piping systems installed at a required slope.
   2. Temporary (above slab/overhead) and new mechanical duct work (below slab).

3.1 DEMOLITION

A. The facility consists of several decades of new and abandoned raceways for communications systems. The contractor should plan on demolishing all overhead raceways within the Terrace level unless it is necessary to maintain temporary communications connections to other areas of the building. Verify if raceways are required to remain operational for temporary service during construction before demolishing. Once phasing of the project has allowed for temporary communications cabling and equipment to be removed, all remaining overhead raceways should be removed.

B. Protect existing communications cabling, 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.

C. Reroute communication cables as required to serve equipment not in the demolition area.

D. Accessible Work: Remove exposed communications equipment and installations, indicated to be demolished, in their entirety.

E. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches (50 mm) below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.

F. Abandoned Work in Historic Plaster ceilings: Where bare and insulated wiring is located in plaster ceiling, it shall be removed unless potential damage to the ceiling. Otherwise cut wiring flush with the plaster and provide necessary coving to ensure the wiring doesn't interfere or damage new wiring and cable.

G. Remove demolished material from Project site.

H. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

I. Remove devices on wall or ceilings being removed. Coordinate with other divisions.

J. Assume that all existing equipment and fittings indicated to be reused are in good working condition and can be installed without repairs. Notify the Architect of items found to be in need of repair or in unusable condition for direction or decision. Repair any damage to equipment caused in removal or handling

K. Fittings and other equipment removed and to be-used shall be cleaned before reinstallation.

L. Added Cables: All cables added shall be coordinated with existing to remain. Where additional cables are added, identify cables per the system as exists in the facility.

M. All material and equipment which is noted or required by the owner to be salvaged and which is not scheduled to be reused or relocated shall be carefully removed and shall be delivered to the owner and stored where directed on the site.

N. Remove all abandoned low voltage wiring. All wiring disconnected on one or both ends is considered abandoned unless tagged and labeled “future” or “spare”. Verify with Owner any cabling connected on both ends is still in use prior to removal.

3.2 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit communications 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. Many areas of the building are considered historic. Diligent effort is to be used when coordinating any removal or installation of communications systems. Preservation of these historic spaces is of high priority. All removal and installation of systems shall be coordinated with the Architectural drawings. If any portion of the building and impact of construction is questionable, the contractor shall inform the Architect and Engineer of the issue as well as any proposed solutions.

D. All repair and refinishing materials and other surfaces shall be coordinated with the Construction Coordinator and Architect. The Construction Coordinator shall be responsible for assigning a qualified tradesman to repair and refinish all surfaces and apply necessary fire stopping.

E. Where cutting and channeling through historic plaster ceilings is required, it shall be coordinated with the General contractor. This work is to be performed by a skilled tradesman.

3.3 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:
   1. Firestopping.
   2. Communications demolition.
   3. Cutting and patching for electrical construction.
   4. Touchup painting.

3.4 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified in Section 099000 "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.

3.5 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.

3.6 COMMUNICATIONS SERVICE OUTAGE AND ENERGIZATIONS

A. Owner Approval: Communications service outages or energizations required shall be approved by the Owner before outages or energization. Outages shall be scheduled at the convenience of the Owner.

B. Written Request: Requests for outages and energizations shall be submitted in writing to the Owner for approval at the earliest possible date and in no case later than 14 days prior to the outage and/or energization.

C. Cancellation: The Owner reserves the right to cancel or change the scheduling of any outage up to 24 hours before its approved starting time. There shall be no additional cost to Owner for scheduled outages, or for outages re-scheduled at the Owner's request where at least 24 hours notice has been given by the Owner.

D. Schedules: A minimum of two (2) weeks before the first outage, submit a schedule of proposed sequence of all the communications services outages and energizations. This schedule shall show construction energizations and shall include any weekend work. The schedule shall list the work to be completed during and between each outage.

E. Minimize all outages on the Owner's communications systems and employ sufficient workmen so that work will be carried on concurrently at more than one location, when necessary.

F. Before submitting any energization and/or outage requests, provide the owner with evidence that the following requirements have been met:
   1. All required equipment and material is on the job site. All related installations that can be worked on without an energization and/or outage are complete, tested, available for inspection, and ready for service.
   2. All shop drawings, test reports, installation data, and operational data have been submitted and approved.
   3. The energizing and outage schedule has been submitted and approved.

END OF SECTION

SECTION 280500
COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Electronic safety and security equipment coordination and installation.
   2. Common electronic safety and security installation requirements.
   3. Cutting and patching for electrical construction.
   4. Touchup painting.
   5. Disposition of existing materials and equipment.
   6. Electronic Safety and Security Service Outage and Energizations.

B. Specification Sections for Video Surveillance and Intercom Systems have been issued for two purposes: to describe the existing system and to explain that the existing system will be extended throughout the build phases. These systems will be constructed of new material and device, but the system is actually going to be extended. These specification sections could have not been issued or stripped down, however they are intended to provide the contractor with insight as to how they should provide temporary solutions that may become permanent.

1.2 COORDINATION

A. Common Work Results
   1. Many components of the building are historic. Preservation of historic materials is of high priority. All removal and installation of systems shall be coordinated with the Architectural drawings. Diligent effort is to be used when coordinating any removal or installation of systems. The contractor shall inform the Architect and Engineer of impact on any historical material that is not noted on the architectural drawings.
   2. Existing systems may be concealed within walls and vertical chases that are noted for demolition. The Contractor shall be responsible to identify the locations of all systems within walls or shafts and to protect those systems that serve occupied spaces in the building at the Terrace level and all upper floors. The Contractor shall inform the Architect and Engineer of impact to building systems serving occupied spaces.

B. Coordinate arrangement, mounting, and support of electronic safety and security equipment:
   1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
   2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
   3. To allow right of way for piping and conduit installed at required slope.
   4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

C. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

D. Coordinate location of access panels and doors for electronic safety and security items that are behind finished surfaces or otherwise concealed.

E. Coordinate chases, slots, inserts, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

F. 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.

G. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability. Document results of said testing.

1.3 DRAWINGS

A. The drawings indicate the arrangements of electrical equipment. Review architectural drawings and details for door swings, cabinets, counters and built-in equipment; conditions indicated on architectural plans shall govern. Coordinate installation of electrical equipment with structural system and mechanical equipment and access thereto. Coordinate installation of recessed electrical equipment with concealed ductwork and piping, and wall thickness. All devices, raceway, and electrical equipment in finished and/or public spaces shall be recessed or concealed unless otherwise noted.

B. Do not scale drawings. Obtain dimensions for layout of equipment from Architectural plans and details unless indicated on Electrical plans.

C. Bring all discrepancies shown on different drawings, between drawings and specifications or between documents and field conditions to the immediate attention of the Architect.

D. Equipment layout is based on one manufacturer's product or from composite dimensions from multiple manufacturers. Where equipment selected for use on the job differs from layout, coordinate space requirements and connection arrangements.

1.4 SITE INVESTIGATION

A. Prior to submitting bids of the project, visit the site of the work to become aware of existing conditions which may affect the cost of the project. Where work under this project requires extension, relocation, reconnections or modifications to existing equipment or systems, the existing equipment or systems shall be restored to their original condition, with the exception of the work under this contract, before the completion of this project. Existing systems and conditions which are not detailed on the drawings must still be restored to their original condition.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electronic safety and security equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

3.2 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.

3.3 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:
   1. Cutting and patching for electrical construction.
   2. Touchup painting.

3.4 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.

3.5 ELECTRONIC SAFETY AND SECURITY SERVICE OUTAGE AND ENERGIZATIONS

A. Owner Approval: Electronic safety and security service outages or energizations required shall be approved by the Owner before outages or energization. Outages shall be scheduled at the convenience of the Owner.

B. Written Request: Requests for outages and energizations shall be submitted in writing to the Owner for approval at the earliest possible date and in no case later than 14 days prior to the outage and/or energization.

C. Cancellation: The Owner reserves the right to cancel or change the scheduling of any outage up to 24 hours before its approved starting time. There shall be no additional cost to Owner for scheduled outages, or for outages re-scheduled at the Owner's request where at least 24 hours' notice has been given by the Owner.

D. Schedules: A minimum of two (2) weeks before the first outage, submit a schedule of proposed sequence of all the electronic safety and security services outages and energizations. This schedule shall show construction energizations and shall include any weekend work. The schedule shall list the work to be completed during and between each outage.

E. Minimize all outages on the Owner's electronic safety and security systems and employ sufficient workmen so that work will be carried on concurrently at more than one location, when necessary.

F. Before submitting any energization and/or outage requests, provide the owner with evidence that the following requirements have been met:
   1. All required equipment and material is on the job site. All related installations that can be worked on without an energization and/or outage are complete, tested, available for inspection, and ready for service.
   2. All shop drawings, test reports, installation data, and operational data have been submitted and approved.
   3. The energizing and outage schedule has been submitted and approved.

END OF SECTION

SECTION 280513
CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. UTP cabling.
   2. 50/125-micrometer (OM3), multimode optical fiber cabling.
   3. RS-232 cabling.
   4. RS-485 cabling.
   5. Low-voltage control cabling.
   6. Control-circuit conductors.
   7. Identification products.

1.2 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. EMI: Electromagnetic interference.

C. IDC: Insulation displacement connector.

D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

E. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).

F. RCDD: Registered Communications Distribution Designer.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

B. Source quality control reports.

C. Field quality control reports.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site.
   1. Test optical fiber cable to determine the continuity of the strand end to end. Use optical fiber flashlight.
   2. Test optical fiber cable on reels. Use an optical time domain reflectometer (OTDR) to verify the cable length and locate cable defects, splices, and connector; include the loss value of each. Retain test data and include the record in maintenance data.
   3. Test each pair of UTP cable for open and short circuits.

1.6 FIELD CONDITIONS

A. Do not install conductors and cables that are wet, moisture damaged, or mold damaged.
   1. Indications that wire and cables are wet or moisture damaged include, but are not limited to, discoloration and sagging of factory packing materials.

B. Environmental Limitations: Do not deliver or install UTP, optical fiber, or connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 50 or less.

B. 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.

2.2 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements for plywood backing panels in Section 061000 "Rough Carpentry."

2.3 UTP CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. SYSTIMAX Solutions; a CommScope, Inc. brand.

B. Description: 100-ohm, four-pair UTP, indoor rated, covered with a thermoplastic jacket.
   1. Comply with ICEA S-90-661 for mechanical properties.
   2. Comply with TIA/EIA-568-C.1 for performance specifications.
   3. Comply with TIA/EIA-568-C.2, Category 6.
   4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
      a. Communications, Plenum Rated: Type CMP or MPP, complying with NFPA 262.

C. Description: 100-ohm, four-pair UTP, Outdoor rated.
   1. Comply with ICEA S-90-661 for mechanical properties.
   2. Comply with TIA/EIA-568-C.1 for performance specifications.
   3. Comply with TIA/EIA-568-C.2, Category 6.
   4. Four thermoplastic-insulated, individually twisted pairs of conductors.
   5. 23-24 AWG, color-coded.
   6. Flooding compound.
   7. UV Sunlight resistant jacket.
   8. Minimum operating temperature range: -40 C to +70 C.

2.4 UTP CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. SYSTIMAX Solutions; a CommScope, Inc. brand.

B. UTP Cable Connecting Hardware: IDC type, using modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of the same category or higher.

C. Connecting Blocks: 110-style for Category 6. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.

2.5 OPTICAL FIBER CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. SYSTIMAX Solutions; a CommScope, Inc. brand.

B. Description: Indoor rated Multimode 50/125-micrometer (OM3), tight buffer, optical fiber cable, strand counts as indicated on drawings.
   1. Comply with ICEA S-83-596 for mechanical properties.
   2. Comply with TIA/EIA-568-C.3 for performance specifications.
   3. Comply with TIA-492AAAA-A for detailed specifications.

4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
   a. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262.
   b. Plenum Rated, Conductive: Type OFCP, complying with NFPA 262.
5. Conductive cable shall be steel or aluminum armored type.
6. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
7. Minimum Modal Bandwidth: 200 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
8. Jacket:
   a. Jacket Color: Orange for 62.5/125-micrometer cable.
   b. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-C.
   c. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

C. Description: Outdoor rated Multimode, 62.5/125-micrometer (OM1), optical fiber cable, strand counts as indicated on drawings.
   1. Comply with ICEA S-87-640 for mechanical properties.
   2. Comply with TIA/EIA-568-C.3 for performance specifications.
   3. Comply with TIA-492AAAA-A for detailed specifications.
   4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
      a. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262.
      b. Plenum Rated, Conductive: Type OFCP, complying with NFPA 262.
   5. Conductive cable shall be steel or aluminum armored type.
   6. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
   7. Minimum Modal Bandwidth: 200 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
   8. Jacket:
      a. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-C.
      b. Imprinted with fiber count, fiber type, and aggregate length at regular intervals, not to exceed 40 inches (1000 mm).

2.6 OPTICAL FIBER CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. SYSTIMAX Solutions; a CommScope, Inc. brand.

B. Cable Connecting Hardware: Meet the Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA-604-2-B, TIA-604-3-B, and TIA/EIA-604-12. Comply with TIA/EIA-568-C.3.
   1. Quick-connect, simplex and duplex, [Type SC] [Type ST] [Type LC] connectors. Insertion loss not more than 0.5 dB.

2.7 RS-232 CABLE

A. Standard Cable: NFPA 70, Type CM.
   1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
   2. Polypropylene insulation.
   3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
   4. PVC jacket.
   5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
   6. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated Cable: NFPA 70, Type CMP.
   1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
   2. Plastic insulation.
   3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
   4. Plastic jacket.
   5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
   6. Flame Resistance: Comply with NFPA 262.

2.8 RS-485 CABLE

A. Standard Cable: NFPA 70, Type CM.

1. Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. Flame Resistance: NFPA 262, Flame Test.

2.9 LOW-VOLTAGE CONTROL CABLE

A. Paired Cable: NFPA 70, Type CMG.

1. One pair, twisted, 18 AWG, stranded (19x30) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with NFPA 262.

2.10 CONTROL-CIRCUIT CONDUCTORS

A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, complying with UL 83, in raceway

B. Class 2 Control Circuits: Stranded copper, power-limited cable, complying with UL 83, concealed in building finishes.

C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or TF, complying with UL 83.

2.11 IDENTIFICATION PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Brady Worldwide, Inc.
2. HellermannTyton North America.
3. Kroy LLC.
4. Panduit Corp.

B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.12 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate cables.

B. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-C.1.

C. Factory test UTP cables according to TIA/EIA-568-C.2.

D. Factory test multimode optical fiber cables according to TIA-526-14-A and TIA/EIA-568-C.3.

E. Cable will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

PART 3 EXECUTION

3.1 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for installation of supports for cables.

3.2 WIRING METHOD

A. Install wiring in metal pathways and wireways.
   1. Minimum conduit size shall be 3/4 inch. Control and data transmission wiring shall not share conduit with other building wiring systems.
   2. Comply with requirements in Division 28 Section "Pathways for Electronic Safety and Security."
   3. Comply with requirements in Division 26 Section "Cable Trays for Electrical Systems."

B. Install cable, concealed in accessible ceilings, walls, and floors when possible.

C. Wiring within Enclosures:
   1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
   2. Install lacing bars and distribution spools.
   3. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer.
   4. Install conductors parallel with or at right angles to sides and back of enclosure.
   5. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks.
   6. Mark each terminal according to system's wiring diagrams.
   7. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1.

B. Conductors: Size according to system manufacturer's written instructions unless otherwise indicated.

C. General Requirements for Cabling:
   1. Comply with TIA/EIA-568-C.1.
   2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
   3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
   4. UTP Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
   5. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
   6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
   7. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
   8. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

D. UTP Cable Installation: Install using techniques, practices, and methods that are consistent with Category 6 rating of components and that ensure Category 6 performance of completed and linked signal paths, end to end.
   1. Comply with TIA/EIA-568-C.2.
   2. Install 110-style IDC termination hardware unless otherwise indicated.
   3. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

E. Optical Fiber Cable Installation:
   1. Comply with TIA/EIA-568-C.3.
   2. Cable shall be terminated on connecting hardware that is rack or cabinet mounted.

F. Open-Cable Installation:
   1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
   2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1525 mm) apart.
   3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

G. Installation of Cable Routed Exposed under Raised Floors:
   1. Install plenum-rated cable only.
   2. Install cabling after the flooring system has been installed in raised floor areas.
   3. Coil cable 72 inches (1830 mm) long shall be neatly coiled not less than 12 inches (300 mm) in diameter below each feed point.

H. Separation from EMI Sources:
   1. Comply with BICSI TDMM and TIA-569-C recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
   2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
      a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
      b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
      c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (600 mm).
   3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
      a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
      b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
      c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
   4. Separation between cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
      a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
      b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (75 mm).
      c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
   5. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
   6. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.4 POWER AND CONTROL-CIRCUIT CONDUCTORS

A. 120-V Power Wiring: Install according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables" unless otherwise indicated.

B. Minimum Conductor Sizes:
   1. Class 1 remote-control and signal circuits, No. 14 AWG.
   2. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
   3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

3.5 CONNECTIONS

A. Comply with requirements in Section 282350 "IP (Network) Video Surveillance System" for connecting, terminating, and identifying wires and cables.

3.6 FIRESTOPPING

A. Comply with TIA-569-C, "Firestopping" Annex A.

B. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.7 GROUNDING

A. For communications wiring, comply with J-STD-607-B and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems."

3.8 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-B. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections:
   1. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-C.1.
   2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
   3. Test UTP cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross connection.
      a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
   4. Optical Fiber Cable Tests:
      a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-C.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
      b. Link End-to-End Attenuation Tests:
         1) Multimode Link Measurements: Test at 850 or 1300 nm in one direction according to TIA-526-14-B, Method B, One Reference Jumper.
         2) Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-C.1.

D. Document data for each measurement: Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.

E. End-to-end cabling will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION

SECTION 280526
GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Grounding conductors.
   2. Grounding connectors.
   3. Grounding busbars.

1.2 DEFINITIONS

A. Signal Ground: The ground reference point designated by manufacturer of the system that is considered to have zero voltage.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 PRODUCTS

2.1 CONDUCTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Harger Lightning and Grounding.
   2. Panduit Corp.
   3. Tyco Electronics Corp.

B. Comply with UL 486A-486B.

C. Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.
   1. Ground wire for custom-length equipment ground jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.

D. Bare Copper Conductors:
   1. Solid Conductors: ASTM B 3.
   2. Stranded Conductors: ASTM B 8.
   3. Tinned Conductors: ASTM B 33.
   4. Bonding Cable: 28 kcmils (14.2 sq. mm), 14 strands of No. 17 AWG conductor, and 1/4 inch (6.3 mm) in diameter.
   5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
   6. Bonding Jumper: Tinned-copper tape, braided conductors terminated with two-hole copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.2 CONNECTORS

A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Burndy; Part of Hubbell Electrical Systems.
   2. Chatsworth Products, Inc.
   3. Harger Lightning and Grounding.
   4. Panduit Corp.
   5. Tyco Electronics Corp.

C. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.
   1. Electroplated tinned copper, C and H shaped.

D. Busbar Connectors: Cast silicon bronze, solderless compression-type mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch (15.8- or 25.4-mm) centers for a two-bolt connection to the busbar.

E. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

PART 3 EXECUTION

3.1 INSTALLATION

A. Comply with IEEE 1100, "Recommended Practice for Power and Grounding Electronic Equipment."
   1. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
   2. Bond shields and drain conductors to ground at only one point in each circuit.

B. Signal Ground:
   1. For each system, establish the signal ground and label that location as such.

C. Comply with NECA 1.

3.2 APPLICATION

A. Conductors: Install solid conductor for No. 8 AWG and smaller and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Grounding and Bonding Conductors:
   1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.
   2. Install without splices.
   3. Support at not more than 36-inch (900-mm) intervals.

3.3 CONNECTIONS

A. Stacking of conductors under a single bolt is not permitted when connecting to busbars.

B. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:
   1. Use crimping tool and the die specific to the connector.
   2. Pretwist the conductor.
   3. Apply an antioxidant compound to all bolted and compression connections.

C. Rack- and Cabinet-Mounted Equipment: Bond powered equipment chassis to the cabinet or rack grounding bar. Power connection shall comply with NFPA 70; the equipment grounding conductor in the power cord of cord- and plug-connected equipment shall be considered as a supplement to bonding requirements in this Section.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:
   1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION

SECTION 280528
PATHWAYS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal conduits, tubing, and fittings.
   2. Nonmetallic conduits, tubing, and fittings.
   3. Optical-fiber-cable pathways and fittings.
   4. Metal wireways and auxiliary gutters.
   5. Nonmetallic wireways and auxiliary gutters.
   6. Surface pathways.
   7. Boxes, enclosures, and cabinets.
   8. Handholes and boxes for exterior underground cabling.

B. Related Requirements:
   1. Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.
   2. Division 26 Section "Raceways and Boxes for Electrical Systems" for conduits, wireways, surface raceways, boxes, enclosures, cabinets, handholes, and faceplate adapters serving electrical systems.

1.2 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.3 SUBMITTALS

A. Product Data: For surface pathways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

C. Samples: For surface pathways and for each color and texture specified, provide sample 12 inches (300 mm) long.

D. Coordination Drawings: Pathway routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
   1. Structural members in paths of pathway groups with common supports.
   2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

E. Source quality control reports.

PART 2 PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. AFC Cable Systems, Inc.
   2. Allied Tube & Conduit; a Tyco International Ltd. Co.
   3. Alpha Wire Company.
   4. Anamet Electrical, Inc.
   5. Electri-Flex Company.

6. O-Z/Gedney; a brand of EGS Electrical Group.
7. Picoma Industries; Subsidiary of Mueller Water Products, Inc.
8. Republic Conduit.
9. Robroy Industries
10. Southwire Company.
11. Thomas & Betts Corporation.
12. Western Tube and Conduit Corporation.
13. Wheatland Tube Company; a division of John Maneely Company.

B. General Requirements for Metal Conduits and Fittings:
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Comply with TIA-569-B.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. ARC: Comply with ANSI C80.5 and UL 6A.

E. IMC: Comply with ANSI C80.6 and UL 1242.

F. PVC-Coated Steel Conduit: PVC-coated [rigid steel conduit] [IMC].
   1. Comply with NEMA RN 1.
   2. Coating Thickness: 0.040 inch (1 mm), minimum.

G. EMT: Comply with ANSI C80.3 and UL 797.

H. FMC: Comply with UL 1; zinc-coated steel.

I. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

J. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
   1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
   2. Fittings for EMT:
      a. Material: Steel.
      b. Type: Setscrew.
   3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 467, rated for environmental conditions where installed, and including flexible external bonding jumper.
   4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

K. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, FITTINGS AND ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. AFC Cable Systems, Inc.
   2. Allied Tube & Conduit; a Tyco International Ltd. Co.
   3. Anamet Electrical, Inc.
   4. Arnco Corporation.
   5. CANTEX Inc.
   6. CertainTeed Corp.
   7. Condux International, Inc.
   8. Electri-Flex Company.
   9. Kraloy.
   10. Lamson & Sessions; Carlon Electrical Products.
   11. Niedax-Kleinhuis USA, Inc.
   12. RACO; a Hubbell Company.
   13. Thomas & Betts Corporation.

B. General Requirements for Nonmetallic Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with TIA-569-B.

C. ENT: Comply with NEMA TC 13 and UL 1653.

D. RNC: Type EPC-40-PVCcomplying with NEMA TC 2 and UL 651 unless otherwise indicated.

E. LFNC: Comply with UL 1660.

F. Rigid HDPE: Comply with UL 651A.

G. Continuous HDPE: Comply with UL 651B.

H. RTRC: Comply with UL 1684A and NEMA TC 14.

I. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

J. Fittings for LFNC: Comply with UL 514B.

K. Duct Accessories:
1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacings indicated while supporting ducts during concreting or backfilling.
2. Warning Tape: Underground-line warning tape specified in Section 260553, "Identification for Electrical Systems."
3. Concrete Warning Planks: Nominal 12 by 24 by 3 inches (300 by 600 by 76 mm) in size, manufactured from 6000-psi (41-MPa) concrete.
   a. Color: Red dye added to concrete during batching.
   b. Mark each plank with "ELECTRIC" in 2-inch- (50-mm-) high, 3/8-inch- (10-mm-) deep letters.

2.3 OPTICAL-FIBER-CABLE PATHWAYS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Alpha Wire Company.
2. Arnco Corporation.
3. Endot Industries Inc.
4. IPEX.
5. Lamson & Sessions; Carlon Electrical Products.

B. Description: Comply with UL 2024; flexible-type pathway, approved for plenum, riser, or general-use installation unless otherwise indicated.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with TIA-569-B.

2.4 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Cooper B-Line, Inc.
2. Hoffman; a Pentair company.
3. Mono-Systems, Inc.
4. Square D; a brand of Schneider Electric.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 4 unless otherwise indicated, and sized according to NFPA 70.
1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with TIA-569-B.

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. Wireway Covers: Hinged type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.5 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Allied Moulded Products, Inc.
   2. Hoffman; a Pentair company.
   3. Lamson & Sessions; Carlon Electrical Products.
   4. Niedax-Kleinhuis USA, Inc.

B. General Requirements for Nonmetallic Wireways and Auxiliary Gutters:
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Comply with TIA-569-B.

C. Description: PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.

D. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.

2.6 SURFACE PATHWAYS

A. General Requirements for Surface Pathways:
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Comply with TIA-569-B.

B. Surface Metal Pathways: Galvanized steel with snap-on covers complying with UL 5.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Mono-Systems, Inc.
      b. Niedax-Kleinhuis USA, Inc.
      c. Panduit Corp.
      d. Wiremold / Legrand.

C. Surface Nonmetallic Pathways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors. Product shall comply with UL 94 V-0 requirements for self-extinguishing characteristics.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Hubbell Incorporated; Wiring Device-Kellems Division.
      b. Lamson & Sessions; Carlon Electrical Products.
      c. Mono-Systems, Inc.
      d. Panduit Corp.
      e. Wiremold / Legrand.

2.7 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Adalet.
   2. Cooper Technologies Company; Cooper Crouse-Hinds.
   3. EGS/Appleton Electric.
   4. Erickson Electrical Equipment Company.

5. Hoffman; a Pentair company.
6. Hubbell Incorporated; Killark Division.
7. Lamson & Sessions; Carlon Electrical Products.
8. Milbank Manufacturing Co.
9. Molex, Woodhead Brand
10. Mono-Systems, Inc.
11. O-Z/Gedney; a brand of EGS Electrical Group.
12. RACO; a Hubbell Company.
13. Robroy Industries.
14. Spring City Electrical Manufacturing Company.
15. Stahlin Non-Metallic Enclosures; a division of Robroy Industries.
16. Thomas & Betts Corporation.
17. Wiremold / Legrand.

B. General Requirements for Boxes, Enclosures, and Cabinets:
   1. Comply with TIA-569-B.
   2. Boxes, enclosures and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet-Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

E. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

H. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

I. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 4, with continuous-hinge cover with flush latch unless otherwise indicated.
   1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
   2. Nonmetallic Enclosures:
      a. Material: Plastic or fiberglass.
   3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

J. Cabinets:
   1. NEMA 250, Type 3R, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
   2. Hinged door in front cover with flush latch and concealed hinge.
   3. Key latch to match panelboards.
   4. Metal barriers to separate wiring of different systems and voltage.
   5. Accessory feet where required for freestanding equipment.
   6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.8 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND CABLING

A. General Requirements for Handholes and Boxes:
   1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
   2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   3. Comply with TIA-569-B.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass or a combination of the two.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Armorcast Products Company.
   b. Carson Industries LLC.
   c. CDR Systems Corporation; Hubbell Power Systems.
   d. NewBasis.
   e. Oldcastle Precast, Inc.; Christy Concrete Products.
   f. Synertech Moulded Products; a division of Oldcastle Precast, Inc.
2. Standard: Comply with SCTE 77.
3. Configuration: Designed for flush burial with closed bottom unless otherwise indicated.
4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC."
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
8. Handholes 12 Inches Wide by 24 Inches Long (300 mm Wide by 600 mm Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

C. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with frame and covers of polymer concrete.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Armorcast Products Company.
      b. Carson Industries LLC.
      c. CDR Systems Corporation; Hubbell Power Systems.
      d. NewBasis.
      e. Nordic Fiberglass, Inc.
      f. Oldcastle Precast, Inc.; Christy Concrete Products.
      g. Synertech Moulded Products; a division of Oldcastle Precast, Inc.
   2. Standard: Comply with SCTE 77.
   3. Color of Frame and Cover: Gray
   4. Configuration: Designed for flush burial with closed bottom unless otherwise indicated.
   5. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
   6. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
   7. Cover Legend: Molded lettering, "ELECTRIC."
   8. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
   9. Handholes 12 Inches Wide by 24 Inches Long (300 mm Wide by 600 mm Long) and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.9 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
   1. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
   2. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 EXECUTION

3.1 PATHWAY APPLICATION

A. Outdoors: Apply pathway products as specified below unless otherwise indicated:
   1. Exposed Conduit: Type EPC-40-PVC.
   2. Concealed Conduit, Aboveground: Type EPC-40-PVC.

3. Underground Conduit: RNC, Type EPC-40-PVC.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 4.

B. Indoors: Apply pathway products as specified below unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: IMC. Pathway locations include the following:
   a. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
   b. Mechanical rooms.
   c. Loading dock.
4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric-Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: IMC.
7. Pathways for Optical-Fiber or Communications Cable in Spaces Used for Environmental Air: Plenum-type, optical-fiber-cable pathway or EMT
8. Pathways for Optical-Fiber or Communications-Cable Risers in Vertical Shafts: Riser-type, optical-fiber-cable pathway.
9. Pathways for Concealed General Purpose Distribution of Optical-Fiber or Communications Cable: General-use, optical-fiber-cable pathway.
10. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 nonmetallic in damp or wet locations.

C. Minimum Pathway Size: 3/4-inch (21-mm) trade size. Minimum size for optical-fiber cables is 1 inch (27 mm).

D. Pathway Fittings: Compatible with pathways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer, and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Install surface pathways only where indicated on Drawings.

G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

A. Comply with NECA 1, NECA 101, and TIA-569-B for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum pathways. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.

B. Keep pathways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.

C. Complete pathway installation before starting conductor installation.

D. Arrange stub-ups so curved portions of bends are not visible above finished slab.

E. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications wiring conduits for which only two 90-degree bends are allowed. Support within 12 inches (300 mm) of changes in direction.

F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

G. Support conduit within 12 inches (300 mm) of enclosures to which attached.

H. Pathways Embedded in Slabs:
   1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure pathways to reinforcement at maximum 10-foot (3-m) intervals.
   2. Arrange pathways to cross building expansion joints at right angles with expansion fittings.
   3. Arrange pathways to keep a minimum of 1 inch (25 mm) of concrete cover in all directions.
   4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
   5. Change from ENT to IMC before rising above floor.

I. Stub-ups to Above Recessed Ceilings:
   1. Use EMT, IMC, or RMC for pathways.
   2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.

K. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.

L. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

M. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to conduit assembly to assure a continuous ground path.

N. Cut conduit perpendicular to the length. For conduits of 2-inch (53-mm) trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.

O. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground pathways designated as spare above grade alongside pathways in use.

P. Surface Pathways:
   1. Install surface pathway for surface electrical outlet boxes only where indicated on Drawings.
   2. Install surface pathway with a minimum 2-inch (50-mm) radius control at bend points.
   3. Secure surface pathway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight pathway section. Support surface pathway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

Q. Pathways for Optical-Fiber and Communications Cable: Install pathways, metal and nonmetallic, rigid and flexible, as follows:
   1. 3/4-Inch (21-mm) Trade Size and Smaller: Install pathways in maximum lengths of 50 feet (15 m).
   2. 1-Inch (27-mm) Trade Size and Larger: Install pathways in maximum lengths of 75 feet (23 m).
   3. Install with a maximum of two 90-degree bends or equivalent for each length of pathway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

R. Install pathway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, 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 pathway sealing fittings according to NFPA 70.

S. Install devices to seal pathway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:
   1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
   2. Where an underground service pathway enters a building or structure.
   3. Where otherwise required by NFPA 70.

T. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.

U. Flexible Conduit Connections: Comply with NEMA RV 3. Use maximum of 72 inches (1830 mm) of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
   1. Use LFMC in damp or wet locations subject to severe physical damage.
   2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

V. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

W. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate, or supported equipment and box.

X. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

Y. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

Z. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

AA. Set metal floor boxes level and flush with finished floor surface.

BB. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:
   1. Excavate trench bottom to provide firm and uniform support for conduit.
   2. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.
   3. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of elbow.
      a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.
      b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch (25 mm) above finished grade.

D. Install handholes with bottom below frost line.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRONIC SAFETY AND SECURITY PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 26 Section "Sleeves and Sleeve Seals for Electronic Safety and Security Pathways and Cabling."

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Division 07 Section "Firestopping."

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.
   1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
   2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 281300
ACCESS CONTROL

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 a security access system consisting of a Server, one or more networked workstation computers, operating system and application software, and field-installed Controllers connected by a high-speed electronic data transmission network. The security access system shall have the following:
   1. Access Control:
      a. Regulating access through doors and gates.
      b. Anti-passback.
      c. Visitor assignment.
      d. Tamper protection.
      e. Secondary alarm annunciator.
      f. Credential cards and readers.
      g. Enrollment center.
      h. Push-button switches.
      i. Credential creation and credential holder database and management.
      j. Monitoring of field-installed devices.
      k. Reporting.
   2. Security:
      a. Integrated video and camera control.
      b. Interface with paging, HVAC, elevator control, and parking control systems.

B. Related Sections include the following:
   1. Division 8 Door Hardware Sections
   2. Division 14 Section "Electric Traction Elevators" to add security access to elevator floor selection controls.
   3. Division 14 Section "Hydraulic Elevators" to add security access to elevator floor selection controls.
   4. Division 28 Section "Video Surveillance" for interface devices and communications protocol to integrate motion detection and video camera selection and positioning into security access system.
   5. Division 28 Section “Fire Alarm” for interface to release security equipment upon fire alarm event.

1.3 DEFINITIONS

A. Server: A PC with software designated as the main controlling PC of the security access system. Where this term is presented with initial capital letters, this definition applies.

B. Controller: An intelligent peripheral control unit that uses a computer for controlling its operation. Where this term is presented with an initial capital letter, this definition applies.

C. CPU: Central processing unit.

D. Credential: Data assigned to an entity and used to identify that entity.

E. Identifier: A credential card, keypad personal identification number or code, biometric characteristic, or other unique identification entered as data into the entry-control database for the purpose of identifying an individual. Where this term is presented with an initial capital letter, this definition applies.

F. PC: Personal computer. This acronym applies to the Server, workstations, and file servers.

G. Wiegand: Patented magnetic principle that uses specially treated wires embedded in the credential card.

H. Workstation: A PC with software that is configured for specific limited security system functions.

1.4 SYSTEM DESCRIPTION

A. System shall consist of a PC-based Server and field-installed Controllers, connected by a high-speed electronic data transmission network.

1. System Software: An extension of the Owner's existing system. Software shall have the following capabilities:
   a. Multiuser multitasking to allow for independent activities and monitoring to occur simultaneously at different workstations.
   b. Graphical user interface to show pull-down menus and a menu tree.
   c. System license shall be for the entire project site and shall include capability for future additions that are within the indicated system size limits specified in this Section.
   d. System shall have open architecture that allows importing and exporting of data and interfacing with other systems that are compatible with Microsoft Windows operating system.
   e. Password-protected operator login and access.

B. Network connecting the Server and workstations shall be a LAN using Ethernet.

1.5 PERFORMANCE REQUIREMENTS

A. Security access system shall use a single database for access-control and credential-creation functions.

B. Distributed Processing: System shall be a fully distributed processing system so that information, including time, date, valid codes, access levels, and similar data, is downloaded to Controllers so that each Controller makes access-control decisions for that Location. Do not use intermediate Controllers for access control. If communications to Server are lost, all Controllers shall automatically buffer event transactions until communications are restored, at which time buffered events shall be uploaded to the Server.

C. Number of Readers and Clients: the system shall have the capacity operate a minimum of 512 card readers and ten (10) clients simultaneously.

D. System Network Requirements:

1. Interconnect system components and provide automatic communication of status changes, commands, field-initiated interrupts, and other communications required for proper system operation.
2. Provide all patch panels, patch cords (copper and/or fiber), routers, switches, and transceivers necessary to form a fully networked system.
3. The access control system network shall be a part of the Capitol Complex Honeywell EBI network, and shall be independent of other building networks. Provide network backbone equipment with sufficient capacity to operate the system in real-time.
4. Communication shall not require operator initiation or response, and shall return to normal after partial or total network interruption such as power loss or transient upset.
5. System shall automatically annunciate communication failures to the operator and identify the communication link that has experienced a partial or total failure.
6. Communications Controller may be used as an interface between the Server display systems and the field device network. Communications Controller shall provide functions required to attain the specified network communications performance.

E. The Server shall provide operator interface, interaction, display, control, and dynamic and real-time monitoring. The Server shall control system networks to interconnect all system components, including workstations and field-installed Controllers.

F. Field equipment shall include Controllers, sensors, and controls. Controllers shall serve as an interface between the Server and sensors and controls. Data exchange between the Server and the Controllers shall include down-line transmission of commands, software, and databases to Controllers. The up-line data exchange from the Controller to the Server shall include status data such as intrusion alarms, status reports, and entry-control records. Controllers are classified as alarm-annunciation or entry-control type.

G. System Response to Alarms: Field device network shall provide a system end-to-end response time of one (1) second or less for every device connected to the system. Alarms shall be annunciated at the Server within 1 second of the alarm occurring at a Controller or device controlled by a local Controller, and within 100 ms if the alarm occurs at the Server. Alarm and status changes shall be displayed within 100 ms after receipt of data by the Server. All graphics shall be displayed, including graphics-generated map displays, on the console monitor within 5 seconds of alarm receipt at the security console.

H. False Alarm Reduction: The design of Server and Controllers shall contain features to reduce false alarms. Equipment and software shall comply with SIA CP-01.

I. Data Line Supervision: System shall initiate an alarm in response to opening, closing, shorting, or grounding of data transmission lines.

J. Door Hardware Interface: Coordinate with Division 8 Sections that specify door hardware required to be monitored or controlled by the security access system. The Controllers in this Section shall have electrical characteristics that match the signal and power requirements of door hardware. Integrate door hardware specified in Division 8 Sections to function with the controls and PC-based software and hardware in this Section.

1.6 SUBMITTALS

A. Product Data: For each type of product indicated. Include operating characteristics, furnished specialties, and accessories. Reference each product to a location on Drawings. Test and evaluation data presented in Product Data shall comply with SIA BIO-01.

B. Shop Drawings:
   1. Diagrams for cable management system.
   2. System labeling schedules, including electronic copy of labeling schedules that are part of the cable and asset identification system of the software specified in Parts 2 and 3.
   3. Wiring Diagrams. Show typical wiring schematics including the following:
      a. Workstation outlets, jacks, and jack assemblies.
      b. Patch cords.
      c. Patch panels.
   4. Cable Administration Drawings: As specified in Part 3 "Identification" Article.
   5. Battery and charger calculations for Server, workstations, and Controllers.

C. Project planning documents as specified in Part 3.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For security system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section " Operation and Maintenance Data," include the following:
   1. Microsoft Windows software documentation.
   2. PC installation and operating documentation, manuals, and software for the PC and all installed peripherals. Software shall include system restore, emergency boot disks, and drivers for all installed hardware. Provide separately for each PC.
   3. Hard copies of manufacturer's specification sheets, operating specifications, design guides, user's guides for software and hardware, and PDF files on CD-ROM of the hard-copy submittal.
   4. System installation and setup guides, with data forms to plan and record options and setup decisions.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1. Cable installer must have on staff a registered communication distribution designer (RCDD) certified by Building Industry Consulting Service International (BICSI).

B. The manufacturer of all hardware and software components employed in the system shall be established vendors to the access control/security monitoring industry for no less than five (5) years.

C. The security system integrator shall have been regularly engaged in the installation and maintenance of integrated access control systems similar in size and scope to that outlined herein for a period of no less than five (5) years.

D. Source Limitations: Obtain Controllers and all software through one source from a single manufacturer.

E. 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.

F. Comply with NFPA 70, "National Electrical Code."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Server, Workstations, and Controllers:

1. Store in temperature- and humidity-controlled environment in original manufacturer's sealed containers. Maintain ambient temperature between 50 and 85 deg F (10 and 30 deg C), and not more than 80 percent relative humidity, noncondensing.
2. Open each container; verify contents against packing list, and file copy of packing list, complete with container identification for inclusion in operation and maintenance data.
3. Mark packing list with designations that have been assigned to materials and equipment for recording in the system labeling schedules that are generated by cable and asset management system specified in Part 2.

1.9 PROJECT CONDITIONS

A. Environmental Conditions: System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Security Control Center: Rated for continuous operation in ambient conditions of 60 to 85 deg F (16 to 30 deg C) and a relative humidity of 20 to 80 percent, noncondensing.
2. Interior, Controlled Environment: System components, except central-station control unit, installed in temperature-controlled interior environments shall be rated for continuous operation in ambient conditions of 36 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing. NEMA 250, Type 1 enclosure.
3. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient conditions of minus 30 to plus 122 deg F (minus 34 to plus 50 deg C) dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation where exposed to rain as specified in NEMA 250.

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. Credential card blanks, ready for printing. Include 500 credential cards for all personnel to be enrolled at the site.

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 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. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SECURITY ACCESS SYSTEM

A. Manufacturers:
   1. Honeywell

2.3 APPLICATION SOFTWARE

A. System Software: Based on existing Honeywell system managed thru EBI platform. Software shall have the following features:
   1. Multiuser multitasking to allow independent activities and monitoring to occur simultaneously at different workstations.
   2. Graphical user interface to show pull-down menus and a menu tree format.
   3. Capability for future additions within the indicated system size limits.
   4. Open architecture that allows importing and exporting of data and interfacing with other systems that are compatible with operating system.
   5. Password-protected operator login and access.

B. Workstation Software:
   1. Password levels shall be individually customized at each workstation to allow or disallow operator access to program functions for each Location.
   2. Workstation event filtering shall allow user to define events and alarms that will be displayed at each workstation. If an alarm is unacknowledged (not handled by another workstation) for a preset amount of time, the alarm will automatically appear on the filtered workstation.

C. Controller Software:
   1. Controllers shall operate as an autonomous intelligent processing unit. Controllers shall make decisions about access control, alarm monitoring, linking functions, and door locking schedules for its operation, independent of other system components. Controllers shall be part of a fully distributed processing control network. The portion of the database associated with a Controller and consisting of parameters, constraints, and the latest value or status of points connected to that Controller, shall be maintained in the Controller.
   2. Functions: The following functions shall be fully implemented and operational within each Controller:
      a. Monitoring inputs.
      b. Controlling outputs.
      c. Automatically reporting alarms to the Server.
      d. Reporting of sensor and output status to Server on request.
      e. Maintaining real time, automatically updated by the Server at least once a day.
      f. Communicating with the Server.
      g. Executing Controller resident programs.
      h. Diagnosing.
      i. Downloading and uploading data to and from the Server.
   3. Individual Controller Operation:
      a. Controllers shall transmit alarms, status changes, and other data to the Server when communications circuits are operable. If communications are not available, Controllers shall function in a stand-alone mode and operational data, including the status and alarm data normally transmitted to the Server, shall be stored for later transmission to the Server.
      b. Controllers shall provide a response to card-readers or keypad entries in less than 0.25 seconds, regardless of system size.
      c. Controllers that are reset, or powered up from a nonpowered state, shall automatically request a parameter download and reboot to its proper working state. This shall happen without any operator intervention.
      d. Initial Startup: When Controllers are brought on-line, database parameters shall be automatically downloaded to them. After initial download is completed, only database changes shall be downloaded to each Controller.

e. Failure Mode: On failure for any reason, Controllers shall perform an orderly shutdown and force Controller outputs to a predetermined failure mode state, consistent with the failure modes shown and the associated control device.
f. Startup After Power Failure: After power is restored, startup software shall initiate self-test diagnostic routines, after which Controllers shall resume normal operation.
g. Startup After Controller Failure: On failure, if the database and application software are no longer resident, Controllers shall not restart, but shall remain in the failure mode until repaired. If database and application programs are resident, Controllers shall immediately resume operation. If not, software shall be restored automatically from the Server.

4. Communications Monitoring:
   a. System shall monitor and report status of communications network at each Location.
   b. Communication status window shall display which Controllers are currently communicating, a total count of missed polls since midnight, and which Controller last missed a poll.
   c. Communication status window shall show the type of CPU, the type of I/O board, and the amount of RAM memory for each Controller.
5. Operating systems shall include a real-time clock function that maintains seconds, minutes, hours, day, date, and month. The real-time clock shall be automatically synchronized with the Server at least once a day to plus or minus 10 seconds. The time synchronization shall be automatic, without operator action and without requiring system shutdown.

D. PC-to-Controller Communications:
   1. Server or workstation communications shall use the following:
      a. TCP/IP LAN network interface cards.
   2. Provide necessary cabling, patch cords, switches, and transceivers.

E. Controller-to-Controller Communications:
   1. Controller-to-Controller Communications: Ethernet

F. Operator Interface:
   1. Inputs in system shall have two icon representations, one for the normal state and one for the abnormal state.
   2. When viewing and controlling inputs, displayed icons shall automatically change to the proper icon to display the current system state in real time. Icons shall also display the input's state, whether armed or bypassed, and if the input is in the armed or bypassed state due to a time zone or a manual command.
   3. Outputs in system shall have two icon representations, one for the secure (locked) state and one for the open (unlocked) state.
   4. Icons displaying status of the I/O points shall be constantly updated to show their current real-time condition without prompting by the operator.
   5. The operator shall be able to scroll the list of I/Os and press the appropriate toolbar button, or right click, to command the system to perform the desired function.
   6. Graphic maps or drawings containing inputs, outputs, and override groups shall include the following:
      a. Database to import and store full-color maps or drawings and allow for input, output, and override group icons to be placed on maps.
      b. Maps to provide real-time display animation and allow for control of points assigned to them.
      c. System to allow cameras, inputs, outputs, and override groups to be placed on different maps.
      d. Software to allow changing the order or priority in which maps will be displayed.
   7. Override Groups Containing I/Os:
      a. System shall incorporate override groups that provide the operator with the status and control over user-defined "sets" of I/Os with a single icon.
      b. Icon shall change automatically to show the live summary status of points in that group.
      c. Override group icon shall provide a method to manually control or set to time zone points in the group.
      d. Override group icon shall allow the expanding of the group to show icons representing the live status for each point in the group, individual control over each point, and the ability to compress the individual icons back into one summary icon.
   8. Schedule Overrides of I/Os and Override Groups:

a. To accommodate temporary schedule changes that do not fall within the holiday parameters, the operator shall have the ability to override schedules individually for each input, output, or override group.
b. Each schedule shall be composed of a minimum of two dates with separate times for each date.
c. The first time and date shall be assigned the override state that the point shall advance to, when the time and date become current.
d. The second time and date shall be assigned the state that the point shall return to, when the time and date become current.

9. Copy command in database shall allow for like data to be copied and then edited for specific requirements, to reduce redundant data entry.

G. Operator Access Control:

1. Control operator access to system controls password-protected operator levels. System operators and managers with appropriate password clearances shall be able to change operator levels for operators.
2. The password shall not be displayed or printed.
3. Each password shall be definable and assignable for the following:
   a. Commands usable.
   b. Access to system software.
   c. Access to application software.
   d. Individual zones that are to be accessed.
   e. Access to database.

H. Operator Commands:

1. Command Input: Plain-language words and acronyms shall allow operators to use the system without extensive training or data-processing backgrounds. System prompts shall be a word, a phrase, or an acronym.
2. Tasks that are executed by operator's commands shall include the following:
   a. Acknowledge Alarms: Used to acknowledge that the operator has observed the alarm message.
   b. Place Zone in Access: Used to remotely disable intrusion alarm circuits emanating from a specific zone. System shall be structured so that console operator cannot disable tamper circuits.
   c. Place Zone in Secure: Used to remotely activate intrusion alarm circuits emanating from a specific zone.
   d. System Test: Allows the operator to initiate a system-wide operational test.
   e. Zone Test: Allows the operator to initiate an operational test for a specific zone.
   f. Print reports.
   g. Change Operator: Used for changing operators.
   h. Security Lighting Controls: Allows the operator to remotely turn on/off security lights.
   i. Display Graphics: Used to display any graphic displays implemented in the system. Graphic displays shall be completed within 20 seconds from time of operator command.
   j. Run system tests.
   k. Generate and format reports.
   l. Request help with the system operation.
      1) Include in main menus.
      2) Provide unique, descriptive, context-sensitive help for selections and functions with the press of one function key.
      3) Provide navigation to specific topic from within the first help window.
      4) Help shall be accessible outside the applications program.
   m. Entry-Control Commands:
      1) Lock (secure) or unlock (open) each controlled entry and exit up to four times a day through time-zone programming.
      2) Arm or disarm each monitored input up to four times a day through time-zone programming.
      3) Enable or disable readers or keypads up to twice a day through time-zone programming.
      4) Enable or disable cards or codes up to four times per day per entry point through access-level programming.

3. Command Input Errors: Show operator input assistance when a command cannot be executed because of operator input errors. Assistance screen shall use plain-language words and phrases to explain why the command cannot be executed. Error responses that require an operator to look up a code in a manual or other document are not acceptable. Conditions causing operator assistance messages include the following:
    a. Command entered is incorrect or incomplete.
    b. Operator is restricted from using that command.
    c. Command addresses a point that is disabled or out of service.
    d. Command addresses a point that does not exist.
    e. Command is outside the system's capacity.

I. Alarms:
1. System Setup:
    a. Assign manual and automatic responses to incoming point status change or alarms.
    b. Automatically respond to input with a link to other inputs, outputs, operator-response plans, unique sound with use of WAV files, and maps or images that graphically represent the point location.
    c. Store the most recent 1000 alarms for recall by the operator using the report generator.
2. Animated Response Graphics: Highlight alarms with flashing icons on graphic maps; display and constantly update the current status of alarm inputs and outputs in real time through animated icons.
3. Multimedia Alarm Annunciation: WAV files to be associated with alarm events for audio annunciation or instructions.
4. Alarm Handling: Each input may be configured so that an alarm cannot be cleared unless it has returned to normal, with options of requiring the operator to enter a comment about disposition of alarm. Allow operator to silence alarm sound when alarm is acknowledged.
5. Video Surveillance Alarm Interface: Allow commands to be sent to Video Surveillance Systems during alarms (or input change of state) through network connections.

J. Alarm Monitoring: Monitor sensors and Controllers and notify operators of an alarm condition. Display higher-priority alarms first and, within alarm priorities, display the oldest unacknowledged alarm first. Operator acknowledgment of one alarm shall not be considered acknowledgment of other alarms nor shall it inhibit reporting of subsequent alarms.
1. Displayed alarm data shall include type of alarm, location of alarm, and secondary alarm messages.
2. Printed alarm data shall include type of alarm, location of alarm, date and time (to nearest second) of occurrence, and operator responses.
3. Maps shall automatically display the alarm condition for each input assigned to that map, if that option is selected for that input location.
4. Alarms initiate a status of "pending" and require the following two handling steps by operators:
    a. First Operator Step: "Acknowledged." This action shall silence sounds associated with the alarm. The alarm remains in the system "Acknowledged" but "Un-Resolved."
    b. Second Operator Step: Operators enter the resolution or operator comment, giving the disposition of the alarm event. The alarm shall then clear.
5. Each workstation shall display the total pending alarms and total unresolved alarms.
6. Each alarm point shall be programmable to disallow the resolution of alarms until the alarm point has returned to its normal state.
7. Alarms shall transmit to Server in real time, except for allowing connection time for dial-up locations.
8. Alarms shall be displayed and managed from a minimum of four different windows.
    a. Input Status Window: Overlay status icon with a large red blinking icon. Selecting the icon will acknowledge the alarm.
    b. History Log Transaction Window: Display name, time, and date in red text. Selecting red text will acknowledge the alarm.
    c. Alarm Log Transaction Window: Display name, time, and date in red. Selecting red text will acknowledge the alarm.
    d. Graphic Map Display: Display a steady colored icon representing each alarm input location. Change icon to flashing red when the alarm occurs. Change icon from flashing red to steady red when the alarm is acknowledged.

9. Once an alarm is acknowledged, the operator shall be prompted to enter comments about the nature of the alarm and actions taken. Operator's comments may be manually entered or selected from a programmed predefined list, or a combination of both.
10. For locations where there are regular alarm occurrences, provide programmed comments. Selecting that comment shall clear the alarm.
11. The time and name of the operator who acknowledged and resolved the alarm shall be recorded in the database.
12. Identical alarms from same alarm point shall be acknowledged at same time the operator acknowledges the first alarm. Identical alarms shall be resolved when the first alarm is resolved.
13. Alarm functions shall have priority over downloading, retrieving, and updating database from workstations and Controllers.
14. When a reader-controlled output (relay) is opened, the corresponding alarm point shall be automatically bypassed.

K. Monitor Display: Display text and graphic maps that include zone status integrated into the display. Colors are used for the various components and current data. Colors shall be uniform throughout the system.
   1. Color Code:
      a. FLASHING RED: Alerts operator that a zone has gone into an alarm or that primary power has failed.
      b. STEADY RED: Alerts operator that a zone is in alarm and alarm has been acknowledged.
      c. YELLOW: Advises operator that a zone is in access.
      d. GREEN: Indicates that a zone is secure and that power is on.
   2. Graphics:
      a. Operators shall be able to view the inputs, outputs, and the point's name by moving the mouse cursor over the point on graphic map.
      b. Inputs or outputs may be placed on multiple graphic maps. The operator shall be able to toggle to view graphic map associated with inputs or outputs.
      c. Each graphic map shall have a display-order sequence number associated with it to provide a predetermined order when toggled to different views.

L. System test software enables operators to initiate a test of the entire system or of a particular portion of the system.
   1. Test Report: The results of each test shall be stored for future display or printout. The report shall document the operational status of system components.

M. Report Generator Software: Include commands to generate reports for displaying, printing, and storing on disk and tape. Reports shall be stored by type, date, and time. Report printing shall be the lowest priority activity. Report generation mode shall be operator selectable but set up initially as periodic, automatic, or on request. Include time and date printed and the name of operator generating the report. Report formats may be configured by operators.
   1. Automatic Printing: Setup shall specify, modify, or inhibit the report to be generated; the time the initial report is to be generated; the time interval between reports; the end of period; and the default printer.
   2. Printing on Requests: An operator may request a printout of any report.
   3. Alarm Reports: Reporting shall be automatic as initially set up. Include alarms recorded by system over the selected time and information about the type of alarm (such as door alarm, intrusion alarm, tamper alarm, etc.), the type of sensor, the location, the time, and the action taken.
   4. Access and Secure Reports: Document zones placed in access, the time placed in access, and the time placed in secure mode.
   5. Custom Reports: Reports tailored to exact requirements of who, what, when, and where. As an option, custom report formats may be stored for future printing.
   6. Automatic History Reports: Named, saved, and scheduled for automatic generation.
   7. Cardholder Reports: Include data, or selected parts of the data, as well as the ability to be sorted by name, card number, imprinted number, or by any of the user-defined fields.
   8. Cardholder by Reader Reports: Based on who has access to a specific reader or group of readers by selecting the readers from a list.
   9. Cardholder by Access-Level Reports: Display everyone that has been assigned to the specified access level.

10. Who Is In (Muster) Report:
    a. Emergency Muster Report: One click operation on toolbar launches report.
    b. Cardholder Report. Contain a count of persons that are "In" at a selected Location and a count with detailed listing of name, date, and time of last use, sorted by the last reader used or by the group assignment.
11. Panel Labels Reports: Printout of control-panel field documentation including the actual location of equipment, programming parameters, and wiring identification. Maintain system installation data within system database so that they are available on-site at all times.
12. Activity and Alarm On-Line Printing: Activity printers for use at workstations; prints all events or alarms only.
13. History Reports: Custom reports that allows the operator to select any date, time, event type, device, output, input, operator, Location, name, or cardholder to be included or excluded from the report.
    a. Initially store history on the hard disk of the host PC.
    b. Permit viewing of the history on workstations or print history to any system printer.
    c. The report shall be definable by a range of dates and times with the ability to have a daily start and stop time over a given date range.
    d. Each report shall depict the date, time, event type, event description, device, or I/O name, cardholder group assignment, and cardholder name or code number.
    e. Each line of a printed report shall be numbered to ensure that the integrity of the report has not been compromised.
    f. Total number of lines of the report shall be given at the end of the report. If the report is run for a single event such as "Alarms," the total shall reflect how many alarms occurred during that period.
14. Reports shall have the following four options:
    a. View on screen.
    b. Print to system printer. Include automatic print spooling and "Print To" options if more than one printer is connected to system.
    c. "Save to File" with full path statement.
    d. System shall have the ability to produce a report indicating status of system inputs and outputs or of inputs and outputs that are abnormal, out of time zone, manually overridden, not reporting, or in alarm.
15. The reports of system database shall allow options so that every data field may be printed.
16. The reports of system database shall be constructed so that the actual position of the printed data shall closely match the position of the data on the data-entry windows.

N. Anti-Passback:
1. System shall have global and local anti-passback features, selectable by Location. System shall support hard and soft anti-passback.
2. Hard Anti-Passback: Once a credential holder is granted access through a reader with one type of designation (IN or OUT), the credential holder may not pass through that type of reader designation until the credential holder passes though a reader of opposite designation.
3. Soft Anti-Passback: Should a violation of the proper IN or OUT sequence occur, access shall be granted, but a unique alarm shall be transmitted to the control station, reporting the credential holder and the door involved in the violation. A separate report may be run on this event.
4. Timed Anti-Passback: A Controller capability that prevents an access code from being used twice at the same device (door) within a user-defined amount of time.
5. Provide four separate zones per Location that can operate without requiring interaction with the host PC (done at Controller). Each reader shall be assignable to one or all four anti-passback zones. In addition, each anti-passback reader can be further designated as "Hard," "Soft," or "Timed" in each of the four anti-passback zones. The four anti-passback zones shall operate independently.
6. The anti-passback schemes shall be definable for each individual door.
7. The Master Access Level shall override anti-passback.
8. System shall have the ability to forgive (or reset) an individual credential holder or the entire credential holder population anti-passback status to a neutral status.

O. Visitor Assignment:

1. Provide for and allow an operator to be restricted to only working with visitors. The visitor badging subsystem shall assign credentials and enroll visitors. Allow only access levels that have been designated as approved for visitors.
2. Provide an automated log of visitor name, time and doors accessed, and whom visitor contacted.
3. Allow a visitor designation to be assigned to a credential holder.
4. Security access system shall be able to restrict the access levels that may be assigned to credentials that are issued to visitors.
5. Allow operator to recall visitors' credential holder file, once a visitor is enrolled in the system.
6. The operator may designate any reader as one that deactivates the credential after use at that reader. The history log shall show the return of the credential.
7. System shall have the ability to use the visitor designation in searches and reports. Reports shall be able to print all or any visitor activity.

P. Training Software: Enables operators to practice system operation including alarm acknowledgment, alarm assessment, response force deployment, and response force communications. System shall continue normal operation during training exercises and shall terminate exercises when an alarm signal is received at the console.

Q. Entry-Control Enrollment Software: Database management functions that allow operators to add, delete, and modify access data as needed.
1. The enrollment station shall not have alarm response or acknowledgment functions.
2. Provide multiple, password-protected access levels. Database management and modification functions shall require a higher operator access level than personnel enrollment functions.
3. The program shall provide means to disable the enrollment station when it is unattended to prevent unauthorized use.
4. The program shall provide a method to enter personnel identifying information into the entry-control database files through enrollment stations. In the case of personnel identity verification subsystems, this shall include biometric data. Allow entry of personnel identifying information into the system database using menu selections and data fields. The data field names shall be customized during setup to suit user and site needs. Personnel identity verification subsystems selected for use with the system shall fully support the enrollment function and shall be compatible with the entry-control database files.
5. Cardholder Data: Provide 99 user-defined fields. System shall have the ability to run searches and reports using any combination of these fields. Each user-defined field shall be configurable, using any combination of the following features:
   a. MASK: Determines a specific format that data must comply with.
   b. REQUIRED: Operator is required to enter data into field before saving.
   c. UNIQUE: Data entered must be unique.
   d. DEACTIVATE DATE: Data entered will be evaluated as an additional deactivate date for all cards assigned to this cardholder.
   e. NAME ID: Data entered will be considered a unique ID for the cardholder.
6. Personnel Search Engine: A report generator with capabilities such as search by last name, first name, group, or any predetermined user-defined data field; by codes not used in definable number of days; by skills; or by seven other methods.
7. Multiple Deactivate Dates for Cards: User-defined fields to be configured as additional stop dates to deactivate any cards assigned to the cardholder.
8. Batch card printing.
9. Default card data can be programmed to speed data entry for sites where most card data are similar.
10. Enhanced ACSII File Import Utility: Allows the importing of cardholder data and images.
11. Card Expire Function: Allows readers to be configured to deactivate cards when a card is used at selected devices.

2.4 SYSTEM DATABASE

A. Database and database management software shall define and modify each point in database using operator commands.

B. Provide connections to the Owner’s existing Database.

2.5 TAMPER PROTECTION

A. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station control-unit alarm display shall identify tamper alarms and indicate locations.

2.6 SERVER HARDWARE

A. Server Computer: Standard unmodified PC of modular design. Performance specifications shall exceed recommended minimums. Coordinate purchase with Owner's IT Department.

B. Provide UPS power to the computer.

C. Server shall be located in Basement Level Security Server Room 042.

2.7 STANDARD WORKSTATION HARDWARE

A. Workstations are existing at Owner's off-site Security Monitoring Center.

2.8 CONTROLLERS

A. Controllers: Intelligent peripheral control unit, complying with UL 294, that stores time, date, valid codes, access levels, and similar data downloaded from the Server or workstation for controlling its operation.

B. Provide door position switch on controller doors to alarm at Security Monitoring Station consoles when controller cabinets are opened.

C. Controllers shall be networked thru RS-485 connections. Controllers connect to the security IP network thru a single existing IP gateway.

D. Subject to compliance with requirements in this Article, manufacturers may use multipurpose Controllers.

E. Battery Backup: Sealed, lead acid; sized to provide run time during a power outage of 90 minutes, complying with UL 924.

F. Alarm Annunciation Controller:
   1. The Controller shall automatically restore communication within 10 seconds after an interruption with the field device network.
      a. Inputs: Monitor dry contacts for changes of state that reflect alarm conditions. Provides at least eight alarm inputs, which are suitable for wiring as normally open or normally closed contacts for alarm conditions.
      b. Alarm-Line Supervision:
         1) Transmit alarm-line-supervision alarm to the Server during the next interrogation cycle after the abnormal current condition.
      c. Outputs: Managed by Server software.

G. Entry-Control Controller:
   1. Function: Provide local entry-control functions including one- and two-way communications with access-control devices such as card readers, keypads, biometric personal identity verification devices, door strikes, magnetic latches, gate and door operators, and exit push-buttons.
      a. Operate as a stand-alone portal Controller using the downloaded database during periods of communication loss between the Controller and the field-device network.
      b. Accept information generated by the entry-control devices; automatically process this information to determine valid identification of the individual present at the portal:
         1) On authentication of the credentials or information presented, check privileges of the identified individual, allowing only those actions granted as privileges.
         2) Privileges shall include, but not be limited to, time of day control, day of week control, group control, and visitor escort control.
      c. Maintain a date-, time-, and Location-stamped record of each transaction. A transaction is defined as any successful or unsuccessful attempt to gain access through a controlled portal by the presentation of credentials or other identifying information.

2. Inputs:
   a. Data from entry-control devices; use this input to change modes between access and secure.
   b. Database downloads and updates from the Server that include enrollment and privilege information.
3. Outputs:
   a. Indicate success or failure of attempts to use entry-control devices and make comparisons of presented information with stored identification information.
   b. Grant or deny entry by sending control signals to portal-control devices[and mask intrusion alarm annunciation from sensors stimulated by authorized entries].
   c. Maintain a date-, time-, and Location-stamped record of each transaction and transmit transaction records to the Server.
   d. Door Prop Alarm: If a portal is held open for longer than 20 seconds, alarm sounds.
4. With power supplies sufficient to power at voltage and frequency required for field devices and portal-control devices.
5. Data Line Problems: For periods of loss of communications with Server, or when data transmission is degraded and generating continuous checksum errors, the Controller shall continue to control entry by accepting identifying information, making authentication decisions, checking privileges, and controlling portal-control devices.
   a. Store up to 1000 transactions during periods of communication loss between the Controller and access-control devices for subsequent upload to the Server on restoration of communication.
6. Manufacturer: Provide PCSC IQ-400 access control panels for up to four readers, and PCSC IQ-1200 panels for up to twelve readers. Security panels shall be installed in accordance with specification set in the PSCS IQ-400/1200 Installation Manual 33-10057-001 Rev B (or most recent edition), no exceptions.

2.9 CARD READERS

A. Power: Card reader shall be powered from its associated Controller, including its standby power source.

B. Response Time: Card reader shall respond to passage requests by generating a signal that is sent to the Controller. Response time shall be 800 ms or less, from the time the card reader finishes reading the credential card until a response signal is generated.

C. Enclosure: Suitable for surface, semiflush, or pedestal mounting. Mounting types shall additionally be suitable for installation in the following locations:
   1. Indoors, controlled environment.
   2. Indoors, uncontrolled environment.
   3. Outdoors, with built-in heaters or other cold-weather equipment to extend the operating temperature range as needed for operation at the site.

D. Display: LED or other type of visual indicator display shall provide visual [and audible] status indications and user prompts. Indicate power on/off, whether user passage requests have been accepted or rejected, and whether the door is locked or unlocked.

E. Proximity Readers:
   1. Active detection proximity card readers shall provide power to compatible credential cards through magnetic induction, and shall receive and decode a unique identification code number transmitted from the credential card.
   2. Passive detection proximity card readers shall use a swept-frequency, RF field generator to read the resonant frequencies of tuned circuits laminated into compatible credential cards. The resonant frequencies read shall constitute a unique identification code number.
   3. The card reader shall read proximity cards in a range from contact with to at least 6 inches (150 mm) from the reader.
   4. Wall mounted card readers shall be HID Thinline II proximity readers, and mullion mounted card readers shall be HID Mini proximity readers. Refer to drawings for reader locations.

2.10 ENROLLMENT CENTER

A. Relocate existing enrollment center located in Capitol Security room B5.

2.11 DOOR CONTACTS

A. Coordinate door and frame preparations with door and frame suppliers.

B. Switches shall be installed in frame head approximately 4" from latching door edge.

C. Self-lock mounting.

D. Hermetically sealed reed switch, encapsulated in polyurethane.

E. Life Cycle: 100,000 full load, 10,000,000 dry circuit

F. Sense Range: 0.5” nominal

G. Provide Sentrol 1078 series for concealed door contacts, Sentrol 2500 series for surface mounted door contacts, and Sentrol 2200 series for overhead door contacts.

2.12 PUSH-BUTTON SWITCHES

A. Push-Button Switches: Momentary-contact back-lighted push buttons, with stainless-steel switch enclosures.

1. Electrical Ratings:
   a. Minimum continuous current rating of 10A at 120 V ac.
   b. Contacts that will make 720 VA at 60A and that will break at 720 VA at 10A.
2. Enclosures: Flush or surface mounting. Push buttons shall be suitable for flush mounting in the switch enclosures.
3. Power: Push-button switches shall be powered from their associated Controller, using dc control.

2.13 REQUEST TO EXIT DEVICES

A. Monitor request to exit devices and shunt alarm signals from doors opened by authorized request to exit inputs. Request to exit devices may be integrated with electric locking hardware (by Division 8).

B. Where not part of an integrated locking device, provide request to exit sensor above doorway on the secured side.

1. Provide dual technology sensors to detect both motion and heat.
2. Sensors shall have adjustable time delay, tamper switch, and two relay outputs.
3. Provide connections to the access control system for shunting of alarm signals.
4. Provide Detection Systems Model DS150 Series request to exit motion sensors.

2.14 DURESS-ALARM SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide the following:

1. Honeywell model 269R

Description: A switch that allows an individual to covertly send a duress signal to master control unit, with no visible or audible indication when activated.

2. Minimum Switch Rating: 50,000 operations.
3. Push Button: Finger activated, suitable for mounting on horizontal or vertical surface.

2.15 POWER SUPPLIES

A. Power Supplies: Low-voltage power supplies matched for voltage and current requirements of access control panels and accessories, type as recommended by manufacturer.

B. Provide 12VDC power supplies for card readers, request to exit (REX), etc, and provide dedicated 12VDC power supplies for each access control panel. Provide 24VDC power supplies for electric strikes, electric locks, and magnetic locks.

1. Enclosure: NEMA 250, Type 1 or 4X.
2. Not required for POE cameras.
3. Manufacturers: Altronix or pre-approved equivalent.

2.16 DOOR AND GATE HARDWARE INTERFACE

A. Exit Device with Alarm: Operation of the exit device shall generate an alarm and annunciate a local alarm. Exit devices are specified in Division 8 Section "Door Hardware."

B. Exit Alarm: Operation of a monitored door shall generate an alarm. Provide piezo electric alarm at each door.

C. Electric Door Strikes: Use end-of-line resistors to provide power line supervision. Signal switches shall transmit data to Controller to indicate when the bolt is not engaged and the strike mechanism is unlocked, and shall report a forced entry. Power and signal shall be from the Controller. Electric strikes are specified in Division 8 "Door Hardware."

D. Electromagnetic Locks: End-of-line resistors shall provide power line supervision. Lock status sensing signal shall positively indicate door is secure. Power and signal shall be from the Controller. Electromagnetic locks are specified in Division 8 Section "Door Hardware."

E. Vehicle Gate Operator: Interface electrical operation of gate with controls of this Section. Vehicle gate operators shall be connected, monitored, and controlled, by the security access Controllers. Vehicle gate and accessories are specified in Division 111200 Section "Parking Control Equipment.

2.17 FLOOR SELECT ELEVATOR CONTROL

A. Elevator access control shall be integral to security access.
   1. System shall be capable of providing full elevator security and control through dedicated Controllers without relying on the host PC for elevator control decisions.
   2. Access-control system shall enable and disable car calls on each floor and floor select buttons in each elevator car, restricting passengers' access to the floors where they have been given access.
   3. System setup shall, through programming, automatically secure and unsecure each floor select button of a car individually by time and day. Each floor select button within a car shall be separately controlled so that some floors may be secure while others remain unsecure.
   4. When a floor select button is secure, it shall require the passenger to use his/her access code and have access to that floor before the floor select button will operate. The passenger's credential shall determine which car call and floor select buttons are to be enabled, restricting access to floors unless authorized by system's access code database. Floor select button shall be enabled only in the car where the credential holder is the passenger.

B. Security access system shall record which call button is pressed, along with credential and time information.
   1. System Controller shall record elevator access data.
   2. The Controller shall reset all additional call buttons that may have been enabled by the user's credential.
   3. The floor select elevator control shall allow for manual override either individually by floor or by cab as a group from a workstation PC.

2.18 CABLES

A. Manufacturers:
   1. Belden Inc.; Electronics Division.
   2. Berk-Tek; a Nexans Company.
   3. General Cable Technologies Corporation.
   4. Mohawk/CDT; a division of Cable Design Technologies.
   5. West Penn Wire/CDT; a division of Cable Design Technologies.
   6. Or approved equal complying with specified requirements.

B. Comply with Division 27 Section "Voice and Data Communication Cabling."

C. PVC-Jacketed, RS-232 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, and individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage; PVC jacket. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
   1. NFPA 70, Type CM.

2. Flame Resistance: UL 1581 Vertical Tray.

D. Plenum-Type, RS-232 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, and individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage; plastic jacket. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.

1. NFPA 70, Type CMP.
2. Flame Resistance: NFPA 262 Flame Test.

E. RS-485 communications require 2 twisted pairs, with a distance limitation of 4000 feet (1220 m).

F. PVC-Jacketed, RS-485 Cable: Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, PVC insulation, unshielded, PVC jacket, and NFPA 70, Type CMG.

G. Plenum-Type, RS-485 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and fluorinated-ethylene-propylene jacket.

1. NFPA 70, Type CMP.
2. Flame Resistance: NFPA 262 Flame Test.

H. LAN Cabling: Comply with Division 27 Section "Voice and Data Communication Cabling."

1. NFPA 262.

2.19 TRANSFORMERS

A. NFPA 70, Class II control transformers, NRTL listed. Transformers for security access-control system shall not be shared with any other system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.

B. Examine roughing-in for LAN and control cable conduit systems to PCs, Controllers, card readers, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.

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

3.2 PREPARATION

A. Comply with recommendations in SIA CP-01.

B. Comply with EIA/TIA-606, "Administration Standard for the Telecommunications Infrastructure of Commercial Buildings."

C. Obtain detailed Project planning forms from manufacturer of access-control system; develop custom forms to suit Project. Fill in all data available from Project plans and specifications and publish as Project planning documents for review and approval.

1. Record setup data for control station and workstations.
2. For each Location, record setup of Controller features and access requirements.
3. Propose start and stop times for time zones and holidays, and match up access levels for doors.
4. Set up groups, facility codes, linking, and list inputs and outputs for each Controller.
5. Assign action message names and compose messages.
6. Set up alarms. Establish interlocks between alarms, intruder detection, and video surveillance features.
7. Prepare and install alarm graphic maps.
8. Develop user-defined fields.
9. Develop screen layout formats.

10. Propose setups for guard tours and key control.
11. Discuss badge layout options; design badges.
12. Complete system diagnostics and operation verification.
13. Prepare a specific plan for system testing, startup, and demonstration.
14. Develop acceptance test concept and, on approval, develop specifics of the test.
15. Develop cable and asset management system details; input data from construction documents. Include system schematics and Visio Technical Drawings.

D. In meetings with Architect and Owner, present Project planning documents and review, adjust, and prepare final setup documents. Use final documents to set up system software.

3.3 CABLING

A. Comply with NECA 1, "Good Workmanship in Electrical Contracting."

B. Install cables and wiring according to requirements in Division 27 Section "Voice and Data Communication Cabling."

C. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters. Conceal raceway and wiring except in unfinished spaces.

D. Install LAN cables using techniques, practices, and methods that are consistent with Div 27 specifications.

E. Install cables without damaging conductors, shield, or jacket.

F. Boxes and enclosures containing security system components or cabling, and which are easily accessible to employees or to the public, shall be provided with a lock. Boxes above ceiling level in occupied areas of the building shall not be considered to be accessible. Junction boxes and small device enclosures below ceiling level and easily accessible to employees or the public shall be covered with a suitable cover plate and secured with tamperproof screws.

G. Install end-of-line resistors at the field device location and not at the Controller or panel location.

3.4 CABLE APPLICATION

A. Comply with EIA/TIA-569, "Commercial Building Standard for Telecommunications Pathways and Spaces."

B. Cable application requirements are minimum requirements and shall be exceeded if recommended or required by manufacturer of system hardware.

C. RS-232 Cabling: Install at a maximum distance of 50 feet (15 m).

D. RS-485 Cabling: Install at a maximum distance of 4000 feet (1220 m).

E. Card Readers and Keypads:
1. Install number of conductor pairs recommended by manufacturer for the functions specified.
2. Unless manufacturer recommends larger conductors, install No. 22 AWG wire if maximum distance from Controller to the reader is 250 feet (75 m), and install No. 20 AWG wire if maximum distance is 500 feet (150 m).
3. For greater distances, install "extender" or "repeater" modules recommended by manufacturer of the Controller.
4. Install minimum No. 18 AWG shielded cable to readers and keypads that draw 50 mA or more.

F. Install minimum No. 16 AWG cable from Controller to electrically powered locks. Do not exceed 250 feet (75 m).

G. Install minimum No. 18 AWG ac power wire from transformer to Controller, with a maximum distance of 25 feet (8 m).

3.5 GROUNDING

A. Comply with Division 26 Section "Grounding and Bonding."

B. Comply with IEEE 1100, "Power and Grounding Sensitive Electronic Equipment."

C. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

D. Bond shields and drain conductors to ground at only one point in each circuit.

E. Signal Ground:
   1. Terminal: Locate in each equipment room and wiring closet; isolate from power system and equipment grounding.
   2. Bus: Mount on wall of main equipment room with standoff insulators.
   3. Backbone Cable: Extend from signal ground bus to signal ground terminal in each equipment room and wiring closet.

3.6 INSTALLATION

A. Push Buttons: Where multiple push buttons are housed within a single switch enclosure, they shall be stacked vertically with each push-button switch labeled with 1/4-inch- (6.4-mm-) high text and symbols as required. Push-button switches shall be connected to the Controller associated with the portal to which they are applied, and shall operate the appropriate electric strike, electric bolt, or other facility release device.

B. Card Readers: Shall be installed as indicated on the detail drawings unless specifically indicated otherwise on the project drawings. The system supplier shall furnish manufacturers' backboxes. The electrical contractor shall provide all other required backboxes.

C. Electrified Door Hardware: Coordinate the installation requirements with the hardware supplier and install the power supplies. Provide connections to all required power supplies. Door openers, door locks, electric hinges, and pushbars shall be installed by the electrical contractor.

D. Fire Alarm Interface: provide necessary input contact points for release of locked doors during fire alarm event.

3.7 IDENTIFICATION

A. In addition to requirements in this Article, comply with applicable requirements in Division 26 Section "Electrical Identification" and with TIA/EIA-606.

B. Using cable and asset management software specified in Part 2, develop Cable Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with same designation. Use logical and systematic designations for facility's architectural arrangement.

C. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
   1. All wiring conductors connected to terminal strips shall be individually numbered, and each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with the name and number of the particular device as shown.
   2. Each wire connected to building-mounted devices is not required to be numbered at the device if the color of the wire is consistent with the associated wire connected and numbered within the panel or cabinet.

D. At completion, cable and asset management software shall reflect as-built conditions.

3.8 SYSTEM SOFTWARE

A. Develop, install, and test software and databases for the complete and proper operation of systems involved. Assign software license to Owner.

3.9 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:
   1. LAN Cable Procedures: Per Div 27.

2. Test each circuit and component of each system. Tests shall include, but are not limited to, measurements of power supply output under maximum load, signal loop resistance, and leakage to ground where applicable. System components with battery backup shall be operated on battery power for a period of not less than 10 percent of the calculated battery operating time. Provide special equipment and software if testing requires special or dedicated equipment.
3. Operational Test: After installation of cables and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.

C. Remove and replace malfunctioning devices and circuits and retest as specified above.

3.10 STARTUP SERVICE

A. Engage a factory-authorized service representative to supervise and assist with startup service. Complete installation and startup checks according to approved procedures that were developed in "Preparation" Article and with manufacturer's written instructions.
   1. Enroll and prepare badges and access cards for Owner's operators, management, and security personnel.

3.11 PROTECTION

A. Maintain strict security during the installation of equipment and software. Rooms housing the control station, and workstations that have been powered up shall be locked and secured, with an activated burglar alarm and access-control system reporting to a Server complying with UL 1610, "Central-Station Burglar-Alarm Units," during periods when a qualified operator in the employ of Contractor is not present.

3.12 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain security access system. Refer to Division 1 Section "Demonstration and Training."

B. Develop separate training modules for the following:
   1. Computer system administration personnel to manage and repair the LAN and databases and to update and maintain software.
   2. Operators who prepare and input credentials to operate the Server and workstations and to enroll personnel.
   3. Security personnel.

C. The suppliers shall provide a minimum of twenty-four (24) hours of training for the security system to the owner's operating personnel.

D. The supplier shall provide the owner with forms and schedules for organization and documentation of all system operating parameters.

END OF SECTION

SECTION 282350
IP (NETWORK) VIDEO SURVEILLANCE SYSTEM

PART 1- GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes a Video Surveillance System consisting of IP cameras, data transmission wiring on building LAN / WAN network equipment, Video Management System (VMS) server(s), storage, and software. The system will be capable of functioning over an IP based network and the Video Management System shall be viewable and configurable via a web browser (HTML interface).

B. Provide camera licensing for each camera installed under the project and provide configuration of the existing Bosch BVMS video management system.

1.3 SYSTEM DESCRIPTION

A. General:

1. The Video Surveillance System shall consist of equipment as specified and indicated on the drawings.
2. Monitoring of the Video Surveillance System shall be available at the following viewing stations:
   a. Security Command Center (Off-Site)
   b. Networked Workstation PC's (via HMTL interface)
3. This section includes labor, material, equipment and related services necessary to furnish, install and connect the system complete with required devices and wiring connections as shown on the drawings and as further specified herein.
4. The system shall include, but not be limited to, cameras, cabling, Video Surveillance System network switches, storage devices, power supplies, system software, and network equipment.
5. The Video Surveillance System shall be provided by a single, Security System Integrator/Contractor who will provide all equipment, engineering, drawings, supervision of the installation, installation of system, site supervision, meetings, programming, and testing.
6. The overall integration of sub-systems and system operation shall be the responsibility of the system provider.
7. The Video Surveillance System shall be an enterprise level software solution capable of expansion beyond initial project capacity.
8. The Video Surveillance System shall be compatible with analog, IP, megapixel and high-definition cameras.
9. The Video Surveillance System camera licensing shall be based on camera count, not device media access control (MAC) address.
10. The video storage system shall be capable of redundantly storing video for the amount of time specified herein. Video storage shall be Owner furnished.

B. Control Functions:

1. The viewing and controlling of the cameras will be on video monitors at any viewing station.
2. All user specific control of the Video Surveillance System will be defined by the Owner during the initialization of the software.

C. System Networking:

1. The Video Surveillance System will transmit all signals to the head end located in the West Main Telecom room. Coordinate with Owner's IT Department to provide all the required connections under this contract.
2. Provide all patch panels, patch cords (copper and/or fiber), network switches, and transceivers necessary to form a fully networked system.

3. The Video Surveillance System equipment for this project shall be incorporated into the existing Security network. Provide network backbone equipment with sufficient capacity to operate the system in real-time. The Network shall have a star topology. No daisy-chaining of network switches shall be allowed.
4. Communication shall not require operator initiation or response, and shall return to normal after partial or total network interruption such as power loss or transient upset.
5. System shall automatically annunciate communication failures to the operator and identify the communication link that has experienced a partial or total failure.

1.4 SUBMITTALS

A. The submittal shall be neatly bound in a comb binder with protective covers. The front cover will include the project name, electrical contractor's name, specification section number, and the submitting equipment supplier.

B. Product Data: For each type of product indicated, including dimensions and data on features, performance, electrical characteristics, ratings, and finishes.

C. Shop drawings shall be clearly legible. Poorly made reproductions of manufacturer's originals shall be returned not approved.

D. Shop Drawings: Detail assemblies of standard components that are custom assembled for specific application on this Project.
   1. Functional Block Diagram: Show single-line interconnections between components for signal transmission and control. Show cable types and sizes.
   2. Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements.
   3. Wiring Diagrams: Power, signal, and control wiring, and grounding. Typical riser drawings which do not reflect the actual project requirements or a riser drawing indicating only partial equipment are not acceptable. Provide riser drawing on 30" x 42" drawing.
   4. The security system contractor shall supply information attesting to the fact that their firm is an authorized product dealer for the system proposed.

E. Equipment List: Include every piece of equipment by model number, manufacturer, serial number, location, and date of original installation. Add pretesting record of each piece of equipment, listing name of person testing, date of test, set points of adjustments, name and description of the view of preset positions, description of alarms, and description of unit output responses to an alarm.

F. Field quality-control test reports.

G. Operation and Maintenance Data: For cameras, power supplies, monitors, network video recorders, and control-station components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Closeout Procedures," include the following:
   1. Lists of spare parts and replacement components recommended to be stored at the site for ready access.

H. Warranty: Special warranty specified in this Section.

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 NECA 1.

C. Comply with NFPA 70.

D. The expansion of the Owner’s existing Video Management System (VMS), video storage system, and related components shall be installed and commissioned by authorized integrators trained and certified by the manufacturer. Certification and training for authorized integrators shall be available from the manufacturer. **Training levels shall be of the highest form available from the manufacturer.**

E. The manufacturer of all hardware and software components employed in the system shall be established vendors to the access control/security monitoring industry for no less than five (5) years.

F. The security system integrator shall have been regularly engaged in the installation and maintenance of integrated access control systems similar in size and scope to that outlined herein for a period of no less than five (5) years.

G. The security system integrator shall provide a minimum of three (3) references whose systems are of similar complexity and have been installed and maintained by the security system contractor in the last five (5) years.

H. The system manufacturer and supplier shall be able to provide complete engineering, technical and support services to properly complete the project as designed. The manufacturer and supplier shall provide:
   1. Project management as required by engineer and owner.
   2. Complete project testing and training to the engineers and owners satisfaction.
   3. Service personnel to be factory trained on the equipment to be provided on the project.
   4. Maintain inventory levels to provide service parts as required by the specification.

I. The system integrator shall possess the following IP Surveillance and Networking Certifications:
   1. MCSE
   2. MCSA
   3. MCP
   4. Comp TIA Security

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
   1. Control Station: Rated for continuous operation in ambient temperatures of 60 to 85 deg F (16 to 29 deg C) and a relative humidity of 20 to 80 percent, noncondensing.
   2. Interior, Controlled Environment: System components, except central-station control unit, installed in air-conditioned interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg F (2 to 50 deg C) dry bulb and 20 to 90 percent relative humidity, noncondensing. NEMA 250, Type 1 enclosures.
   3. Interior, Uncontrolled Environment: System components installed in non-temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 0 to 122 deg F (minus 18 to plus 50 deg C) dry bulb and 20 to 90 percent relative humidity, noncondensing. NEMA 250, Type 3R enclosures.
   4. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of minus 40 to plus 122 deg F (minus 40 to plus 50 deg C) dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph (137 km/h) and snow cover up to 24 inches (610 mm) thick. NEMA 250, Type 4 enclosures.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of cameras, equipment related to camera operation, and control-station equipment that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Three years from date of Substantial Completion.

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 Manufacturers:
      a. Bosch (Cameras, camera mounting hardware, existing VMS, server/storage)
      b. ComNet (Fiber Transceivers)

c. IFS/GE (Fiber Transceivers)
d. Cisco (Network Switches)
e. Vigitron (UTP Extenders)

2.2 SYSTEM REQUIREMENTS

A. The system shall support multiple video formats: JPEG, MPEG-4, H.264, etc.

B. Provide calculations to advise Owner on storage requirements for 14 days of video storage per camera, unless indicated otherwise. Final storage capacity requirements to be determined during installation.

C. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor entry connection to components.

1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Division 26 Section "Transient Voltage Suppression."
2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Division 26 Section "Transient Voltage Suppression" as recommended by manufacturer for type of line being protected.

2.3 IP CAMERAS

A. All cameras shall be vandal resistant, denoted with a V appended to the Axis part number.

B. All exterior cameras shall be exterior rated, denoted with an E appended to the Axis part number.

C. Network Color Camera (Fixed):

1. Frame Rate: 30 fps, set to fixed or variable by available bandwidth.
2. IP Filter: Restrict access to selected users. Up to ten groups can be established by defining IP address range for each group.
   a. Password protection allows up to four levels of access. Administrator level has total access, other three levels set to limit user privileges.
3. 1/4" (min) imaging device for minimum resolution of 480 vertical lines.
4. Lens Adjustment: Auto-iris spot focus and zoom rings
5. Lens: sized to accommodate viewing scene.
6. Format Options: JPEG, MPEG-4, H.264.
7. Selectable compression ratios.
8. Automatic Gain Control
9. Backlight compensation (BLC).
10. Motion Detection: Selectable sensitivity and threshold
11. PoE – IEEE 802.3af compliant for power-over-ethernet.
12. Network Video Output: 10BASE-T/100BASE-TX, RJ45 connector on back panel for CCTV system connection.
13. Operating Temperature: -40° to 140°F (-40° to 60°C) with heater
14. Mounting: Bracket for wall, ceiling, or pendant. Enclosure for exterior. Refer to plans and schedule for requirements.
15. Wide Dynamic Range.
16. Provide Bosch cameras.

D. Network Color Camera (Dome/Pan Tilt Zoom)

1. Similar features as network color camera above. In addition:
2. Built-in auto-focus.
3. 18 x optical zoom lens.
4. 12 x digital zoom.
5. Audio Monitoring.
6. Mounting: Wall, surface ceiling, flush ceiling with bracket and trim.
7. Outdoor Use: IP66 standard for protection against water and dust.
8. Panning ± 150 degrees minimum.
9. Tilting ± 75 degrees minimum.
10. Rotating ± 150 degrees minimum.
11. x2.7 Vari-focel auto iris lens.

12. Wide Dynamic Range.
13. Provide Bosch cameras.

E. HD (720P/1080P) Network Color Camera (Fixed):

1. Frame Rate: 30 fps, set to fixed or variable by available bandwidth.
2. IP Filter: Restrict access to selected users. Up to ten groups can be established by defining IP address range for each group.
   a. Password protection allows up to four levels of access. Administrator level has total access, other three levels set to limit user privileges.
3. Resolution: HD (720P/1080P) Class, 1/4"(min) imaging device.
4. Lens Adjustment: Spot focus and zoom rings
5. Lens: sized to accommodate viewing scene.
6. Format Options: JPEG, MPEG-4, H.264.
7. Selectable compression ratios.
8. Automatic Gain Control
9. Backlight compensation (BLC).
10. Motion Detection: Selectable sensitivity and threshold
11. POE – IEEE 802.3af compliant for power-over-ethernet.
12. Network Video Output: 10BASE-T/100BASE-TX, RJ45 connector on back panel for video surveillance system connection.
13. Operating Temperature: -40° to 140°F (-40° to 60°C) with heater
14. Mounting: Bracket for wall, ceiling, or pendant. Enclosure for exterior. Refer to plans and schedule for requirements.
15. Wide Dynamic Range.
16. Provide Bosch Cameras.

F. Network Color Camera (Dome/Pan Tilt Zoom)

1. Similar features as network color camera above. In addition:
2. Built-in auto-focus.
3. 18 x optical zoom lens.
4. 12 x digital zoom.
5. Audio Monitoring.
6. Mounting: Wall, surface ceiling, flush ceiling with bracket and trim.
7. Outdoor Use: IP66 standard for protection against water and dust.
8. Panning ± 150 degrees minimum.
9. Tilting ± 75 degrees minimum.
10. Rotating ± 150 degrees minimum.
11. x2.7 Vari-focel auto iris lens.
12. Provide Bosch Cameras.

2.4 CAMERA-SUPPORTING EQUIPMENT

A. Mounting Brackets for Fixed Cameras: Type matched to items supported and mounting conditions. Include manual pan-and-tilt adjustment.

B. Protective Housings for Fixed and Movable Cameras: Vandal resistant housing shall be constructed of steel or 6061T6 aluminum with internal camera mounting and connecting provisions that are matched to camera/lens combination and mounting and installing arrangement of camera to be housed.

1. Enclosure Rating: IEC 60529, IP 52.

2.5 SERVER/STORAGE SYSTEM

A. Existing Storage is IP attached via Gigabit Ethernet backbone using commonly available networking configurations and equipment.

B. The existing storage system is capable of operation at RAID Level 0, 1, 1+0, 4, and 5. Any Video Management System configuration under this project shall support recording at RAID Level 5.

2.6 NETWORK SWITCHES

A. Provide Cisco PoE 24 port network switches for compatibility with the Capitol Complex security network. No alternatives shall be acceptable. Provide all required SFP modules.

B. Coordinate installation with the Owner.

C. Switch configuration will be by Capitol Security.

2.7 OPERATOR STATION

A. The existing Security Command Center operator consoles are located off-site.

B. Network operator workstation PC's shall be Owner furnished.

2.8 ADMINISTRATION SERVERS/STATIONS

1. The Administration Servers/Stations are existing to remain. Provide configuration of the Owner's VMS Administration Servers/Stations in coordination with Capitol Security staff. Existing system functionality shall not be disrupted by this project.

2.9 NETWORK CABLING

A. The Local Area Network (LAN) and Wide Area Network (WAN) shall provide for communication between the system elements. All interfaces to the transmitters shall be 100BaseT/1000BaseTX Ethernet. The LAN may use additional technologies within the backbone for greater speed or distance. Acceptable types are:

1. Gigabit Ethernet - 1000Base-SX and 1000Base-LX standards.
2. 10 Gigabit Ethernet - 10GBASE-S and 10GBASE-L standards.

B. The LAN uses standard TIA/EIA-568 network cables. Comply with requirements in Division 27 "Structured Cabling." Acceptable cable types are:

1. Optical Fiber: 50/125 um laser optimized (OM3) multimode.
2. Outdoor Category 6 Unshielded Twisted Pair (UTP).

C. All fiber optic cabling and UTP cabling shall be by Division 27 Contractor. Refer to Division 27 for cabling requirements and refer to floor plans for additional information.

D. The LAN shall be physically integrated with the Owner's existing Security LAN infrastructure. Interconnection to other LANs shall be through one of the following:

1. A Layer 3 capable network switch
2. An additional VLAN to the existing LAN equipment. When required to interconnect VLANs, a router or Layer 3 capable switch shall be provided.

E. Provide all electronics (routers, network switches, etc.) required for cameras to operate on the building LAN/WAN. To ensure quality of available bandwidth, the designed network load shall not exceed 50% of manufacturer specified maximum bandwidth of associated device.

2.10 VIDEO MANAGEMENT SYSTEM SOFTWARE

A. Provide camera licenses for the Bosch BVMS Video Management System software. Functional requirements are described in Part 3 – Execution.

B. Operator Station

1. The operator stations are existing and will include the following system software components:
   a. Application software detailed in the security or Control System Specification.
   b. Windows 7.
   c. Application software with functionality detailed in Section 3.6.

C. Video Recording

1. VMS shall be capable of recording video frame rates from 1FPS up to the maximum frame rate output of each camera.
2. Video frame rate shall be program-adjustable. The frame rate shall be capable of being increased upon detection of motion by the VMS.
3. The VMS shall be capable of supporting pre-roll recording function.

4. The VMS shall be capable of supporting all H.264 video compression formats supported by each camera.

D. Network

1. Each Ethernet switch shall support:
   a. Simple Network Management Protocol (SNMP).
   b. IEEE 802.1D bridging capability and loop detection.
   c. IEEE 802.1Q tagged VLANs
   d. IEEE 802.1p traffic prioritization for multiple Quality of Service levels.
   e. Multicast network traffic.
   f. Non-blocking configuration capable of simultaneous wire-speed switching across all ports.

PART 3 - EXECUTION

3.1 WIRING

A. Wiring Method: Install cables concealed in accessible ceilings, walls, and floors where possible.

B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

C. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. 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.

D. Grounding: Provide independent-signal circuit grounding as recommended by the manufacturer.

3.2 VIDEO SURVEILLANCE SYSTEM INSTALLATION

A. Install cameras level and plumb.

B. Install cameras with 84-inch- (2134-mm-) minimum clear space below cameras and their mountings. Change type of mounting to achieve required clearance.

C. Set pan unit and pan-and-tilt unit stops to suit final camera position and to obtain the field of view required for camera. Connect all controls and alarms, and adjust.

D. Install power supplies and other auxiliary components in telecom rooms, unless otherwise indicated.

E. Avoid ground loops by making ground connections in only telecom rooms.

F. Identify system components, wiring, cabling, and terminals according to Division 26 Section “Electrical Identification."

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation and supervise pretesting, testing, and adjusting of video surveillance equipment.

B. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.

C. Pretesting: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements. Conduct tests at varying lighting levels, including day and night scenes as applicable. Prepare video surveillance equipment for acceptance and operational testing as follows:

1. Prepare equipment list described in Part 1 "Submittals" Article.
2. Verify operation of auto-iris lenses.
3. Set back-focus of fixed focal length lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Adjust until image is in focus with and without the filter.

4. Set back-focus of zoom lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Additionally, set zoom to full wide angle and aim camera at an object 50 to 75 feet (17 to 23 m) away. Adjust until image is in focus from full wide angle to full telephoto, with the filter in place.
5. Set and name all preset positions; consult Owner's personnel.
6. Set sensitivity of motion detection.
7. Connect and verify responses to alarms.
8. Verify operation of control-station equipment.

D. Test Schedule: Schedule tests after pretesting has been successfully completed and system has been in normal functional operation for at least 14 days. Provide a minimum of 10 days' notice of test schedule.

E. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.

F. Remove and replace malfunctioning items and retest as specified above.

G. Record test results for each piece of equipment.

H. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

3.4 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions and to optimize performance of the installed equipment. Tasks shall include, but are not limited to, the following:
1. Check cable connections.
2. Check proper operation of cameras and lenses. Verify operation of auto-iris lenses and adjust back-focus as needed.
3. Adjust all preset positions; consult Owner's personnel.
4. Recommend changes to cameras, lenses, and associated equipment to improve Owner' utilization of video surveillance system.
5. Provide a written report of adjustments and recommendations.

3.5 CLEANING

A. Clean installed items using methods and materials recommended in writing by manufacturer.

B. Clean video surveillance system components, including camera-housing windows, lenses, and monitor screens.

3.6 APPLICATION SOFTWARE FUNCTIONS

A. The system functionality can be divided into:
1. Viewing live video.
2. Receiving and transmitting audio.
3. Recording administration.
4. Playing back recorded video.
5. PTZ telemetry.
6. Alarm events.
7. Administration.

B. Viewing Live Video
1. It must be possible to view live video from any where on the network, including over wide area network connections, through routers, firewalls and NATs.
2. The live output from cameras shall be viewed through a series of displays. These shall support:
   a. Single camera view.
   b. 4/9/16/25 view.
   c. Full screen view, including ¼/9/16/25 images.
   d. Sequence view of camera preset positions.

e. Modifying settings for a camera.
f. Modifying recording settings for a camera.
g. Adding and deleting cameras.
h. Creating schedules for recordings and video motion detection.
i. Modifying video motion detection settings and tuning.

3. Users shall be able to select a camera from a tree control listing the cameras available to the user.
4. The system shall also support multiple monitors in the following way:
   a. Alarm monitor: When an alarm occurs in the administration or operator server, the live video output of the camera associated with that alarm shall be switched directly to an alarm monitor.
   b. Surveillance monitor: Operators shall be able to send any sequence View or Single Camera View to a surveillance monitor.
5. In both these cases, the video shall be provided by a network receiver, or a PC monitor.
6. Systems that do not offer both of these functions are not acceptable.

C. Single Camera

1. From this display, the user shall be able to:
   a. View the live output from the selected camera
   b. Pan, tilt, zoom and focus the camera using a keyboard attached to the operator station PC.
   c. Pan, tilt, zoom and focus the camera using a pointing device attached to the operator station PC. Standard HID pointing devices such as a mouse or touch-screen shall be supported.
   d. For cameras that support continuous pan, tilt, zoom (PTZ), a mouse shall be able to be used for continuous PTZ directly using video window. The operator shall be able to tilt the camera up or down, or pan the camera left or right. Variable-speed PTZ must also be supported. Zooming must also be provided using the mouse in a similar way.
   e. Manually record live video. Recording will continue for the configured period of time. Once recording has begun, a stop button shall be available.
   f. Indicate whether video motion detection is currently enabled for the selected camera.

D. Quad/9/16/25 View

1. The VMS shall support up to 25 simultaneous views. The views are up to 25 related cameras viewed simultaneously on a single display.
2. The screen shall be divided into 25 views. For each view the video pane shall have a camera or be blank. Each view shall be configured to cycle between any of the cameras accessible to the user on a configurable time basis.
3. There shall be no limit to the number of cameras that can be assigned to a single view. There shall also be no limit to the number of available views across multiple displays.
4. Quad/6/16/25 view must be capable of supporting full frame rate on all windows.

E. Sequence View

1. The VMS shall support sequence views. A sequence view consists of a single camera view, which can be cycled on a time basis. Pan-tilt-zoom cameras, which support preset positions can have these presets cycled on a time basis. In this way an operator can view a variety of presets on a series of PTZ cameras. Fixed cameras can also be included in the sequence and cycled accordingly.
2. There shall be no limit to the number of cameras that can be assigned to a single sequence view. There shall also be no limit to the number of available sequence views.

F. Map Interface

1. The viewing software shall support a map based interface.
2. There shall be no limit to the number of maps in the system and the maps should be navigable by links on the maps.
   a. Cameras and Alarms shall be shown on the maps.
   b. Alarms must flash on the maps when activated.
   c. Maps must automatically pop up on camera alarm.
   d. It must be possible to drag a camera from the map to a video pane.
   e. The map should be capable of being run in single screen or dual screen configurations.

G. Receiving and Transmitting Audio

1. The following audio features shall be supported in the software:
    a. Select/deselect receipt of audio from a live video window.
    b. Select/deselect transmission of audio from the PC to a video transmitter.

H. Recording Administration
1. The following methods of recording live video shall be supported:
    a. User activated
    b. Event activated
    c. Scheduled
    d. Video motion detection
    e. Video Loss alarm
2. With the exception of user-activated recordings, the creation of all recording schedules shall be an administrative function only.

I. User Activated
1. The user shall be able to initiate recordings from a transmitter that is currently being viewed. The destination NVR of this recording will defined by the administrator only.

J. Event Activated
1. It shall be possible for an NVR to autonomously initiate a recording based on a transmitter binary I/O alarm event. Programming an NVR to record on event shall be an administrative function only.
2. The retention period for recordings is global for each NVR.
3. In the case of multiple alarms/events relating to the same camera, a video clip shall be created to include each alarm/event.
4. For cameras that support Pan/Tilt/Zoom presets, a specified preset location shall be offered to the user when the alarm/event occurs prior to the event activated recording commencing. For example, when an alarm is detected on a security door, the alarm shall give the user the option to move the PTZ camera to a preset position, which is pointing at the door subsequent to the VMS commencing recording.

K. Scheduled Recording
1. The system shall support the ability to schedule recordings for each individual camera for times in the future. For each scheduled recording the user shall be able to configure the:
    a. Start time.
    b. Stop time.
    c. Bit rate for the recording.
    d. Retention period before the recording will be deleted.
    e. Recurrence (if this is to be a recurring schedule).
    f. Description (at least 255 characters).
2. There shall be no limit on the number of schedules that can be entered for the system. There shall be no limit to the number of schedules per camera.

L. Motion Detection Recording
1. The VMS system must be able to activate recordings automatically when motion is detected on any camera that has video motion detection enabled. The receipt of video motion alarm events shall be either:
    a. On a continuous basis.
    b. Scheduled for particular times, dates, days, months etc.
2. The user shall be able to configure the following parameters for each camera:
    a. Detection Type: Continuous or scheduled
    b. Actions to Perform When Motion is Detected: When motion is detected, the following actions shall be performed automatically.
        1) Log an event.
        2) Bring camera up to pre-selected monitor.

M. Recording Video
1. The VMS shall allow camera output to be recorded for the following conditions:
    a. Activated by administrators, operators, alarms or events
    b. Manually activated by a user viewing a live camera
    c. Scheduled recording

    d. Video motion detection
  2. Event-activated recording is a process that allows a segment of video or a snapshot to be associated with a security system or control system alarm or event.
  3. User-activated recording occurs when a user viewing live video chooses to record the currently viewed camera output by selecting the “Record” button.
  4. Scheduled recording allows video to be recorded between start and stop times on defined days.
  5. Video motion detection activated recording is a process that allows a segment of video or a snapshot to be recorded when motion is detected by the VMS.
  6. Recorded video is stored on the video server. The operator station shall be able to query the video server to locate relevant recorded video and to then replay that video at the operator station.

N. Review of Recordings
  1. Review of recordings shall be a function available to both administrators and operators (where the administrator has given access to the operator).

O. Playback
  1. The operator must be able to perform the following playback functions:
    a. Fast Forward. Supported speeds should include x1, x2, x4 and x8 – skip forward (i.e. between key frames) is not acceptable.
    b. Single frame forward/back. Key frame forward/back is not acceptable.
    c. Slow Speed Playback/review. The system should offer playback at slow speeds, including ½ speed and ¼ speed.
  2. It must be possible to playback over wide area network connections, through routers, firewalls and NATs.

P. Search for Recordings
  1. The system shall allow the operator to search for video on the basis of camera, time, motion and event.

Q. Search by Camera and Time
  1. The VMS shall provide a simple search for all video recorded on the Networked Video Recorders. The user selects the camera of interest and the point on the time indicator.
  2. The user shall select from the list of available cameras. It shall also include any cameras that have been deleted from the video server but still have video stored on the video server or on archived media. If a camera has been deleted and all video associated with the camera has been deleted, the camera name will not appear in this list.
  3. The user should not need to select the appropriate recordings device in order to find video; multiple NVRs should appear as a single device on the network, regardless of physical location.

R. Motion Search
  1. The VMS shall provide an advanced search of recorded video. The search shall be based on motion within a time region section. This motion search must include the option to mask certain areas of the image to ignore motion.
  2. It must be possible to jump forward to time points where the degree of motion has exceeded a threshold. This threshold level should be user configurable to values of between 0 and 100. Binary motion threshold (i.e. motion or no motion) is not acceptable.

S. Search by Alarm
  1. The VMS shall allow the user to search for video from a selected camera, over a specified period of time, based on events generated by the transmitter. The events types should be:
    a. Motion Detection event
    b. Binary Alarm event
    c. Video Loss event

T. Thumbnails of recording
  1. It shall be possible to generate thumbnails from a recording of any length.
  2. Thumbnails should be based on time, alarms or motion.
  3. Double clicking on a thumbnail should immediately start playback from that position.
  4. Scrolling the timeline must refresh the thumbnails.

5. Each thumbnail shall have a timestamp.
6. 36 thumbnails from 8 hours of recording shall be generated in 3 seconds or less on a local area network.

U. Exporting Recordings
1. It shall be possible to export video from an NVR to any other network storage devices including a network drive, CD and DVD. An exported file must be in the MP4 format and, as such, should be readable using QuickTime Player or any other MP4 compliant decoding software.
2. It shall be possible to export any section of video from any recording.

V. Administration
1. Administrators shall be able to change camera settings, camera details and configure the video settings.

W. Camera Settings
1. Users shall be able to change key settings for an individual camera. The details are grouped into several sections:
   a. Camera details.
   b. Camera connection.
   c. Camera PTZ Control.
   d. Camera deletion.
2. Only users with the highest level of security are permitted to modify camera connection details, camera PTZ control or delete cameras.

X. Camera Details
1. The administrator shall be able to configure the following parameters for each camera:
   a. Name
   b. Location
   c. Description
   d. Camera number

Y. Camera Connection
1. The user shall be able to configure the following parameters for each camera:
   a. Codec function (i.e. encoder or decoder).
   b. Resolution: The available resolutions shall be 620 by 480 pixels or better (depending on the functionality of the camera.).
   c. Video Quality: The supported frame rates (in frames per second) shall be 30, 25, 20, 15, 10, 5, 3, 2 and 1. Slower frame rates of 1 frame every 2, 3, 5, or 10 seconds shall also be available.
   d. Transmitter IP address.
   e. Choice of frame rate or bandwidth limited streaming.
   f. TCP, Unicast or multicast transmission of video.
   g. PAL or NTSC camera format.
   h. User configurable levels of video compression between 16Kbps and 4Mbps.

Z. Camera Control
1. The following PTZ characteristics shall be tuneable on a camera-by-camera basis from the camera definition pages:
   a. Pan speed
   b. Tilt speed
   c. Zoom speed
   d. Focus speed
   e. Iris speed
   f. Up to 10 user configurable functions (e.g. preset positions)

AA. Security
1. The following parameters shall be configurable for each camera:
   a. Area: Allows the system to be configured to only allow users to view specified cameras. These areas shall be the defined by the administration client or operator server.

b. Control Level: Determines if a user is allowed to operate the PTZ controls for a camera. Also used to allow higher-level users to take control of cameras. The administration server or operator server shall define these control levels.
c. IP access. It should be possible to exclude/include access to devices on the basis of IP address.

BB. Delete

1. Even an administrator with the highest-level security will not be able to delete the camera from the video recording server. It should be possible for an administrator to remove users' access to recordings. The name of the camera will no longer appear in the users' list of cameras. All camera settings will be deleted.

CC. Video Integration User Tasks

1. The following system tasks shall be performed from the operator/administration station:
   a. View live video.
   b. Adjust the PTZ position of a camera.
   c. Automatically display live video on a monitor when an event occurs.
   d. Search through the stored video clips of a camera.
   e. Allow an operator to record an incident.
   f. Add a new camera to the system.
   g. Change the configuration settings for a camera/transmitter.
   h. Provide alarm/event-activated recording from the administration system.
   i. Search for video clips from different cameras.
   j. Create a camera tour.
   k. Conduct a camera tour.
   l. Create a camera group.
   m. View a camera group.
   n. View a camera sequence.
   o. View a quad view screen.
   p. View live video from a custom schematic.
   q. Add live video to a custom schematic.
   r. Configure, schedule and tune video motion detection.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain video surveillance equipment.
   1. Train Owner's maintenance personnel on procedures and schedules for troubleshooting, servicing, and maintaining equipment.
   2. Demonstrate methods of determining optimum alignment and adjustment of components and settings for system controls.
   3. Review equipment list and data in maintenance manuals. Refer to Division 1 Section "Closeout Procedures."
   4. Conduct a minimum of twenty-four 24 hours of training as specified in instructions to Owner's employees in Division 1 Section "Closeout Procedures."

B. The supplier shall provide the owner with forms and schedules for organization and documentation of all system operating parameters.

END OF SECTION

SECTION 283111
FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Section 210500 Common Work Results For Fire Suppression

B. Section 211000 Water-based Fire-suppression Systems

C. Section 211002 Water-based Fire-suppression Systems

D. Section 213113 Electric-drive, Centrifugal Fire Pumps

E. Section 230900 Instrumentation and Controls For HVAC

F. Section 230993 Sequence of Operation For HVAC Controls

G. Section 260500 Common Work Results for Electrical

H. Section 260519 Low-Voltage Electrical Power Conductors and Cables

I. Section 260529 Hangers and Supports for Electrical Systems

J. Section 260533 Raceways and Boxes for Electrical Systems

K. Section 262726 Wiring Devices

L. Section 280500 Common Work Results for Electronic Safety and Security

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

1.2 SUMMARY

A. Section Includes:

1. Fire Alarm Control Panel.
2. Manual fire-alarm boxes.
3. System smoke detectors.
4. Nonsystem smoke detectors.
5. Heat detectors.
6. Notification appliances.
7. Magnetic door holders.
8. Remote annunciator.
9. Addressable interface device.

1.3 DEFINITIONS

A. LED: Light-emitting diode.

B. NICET: National Institute for Certification in Engineering Technologies.

1.4 SYSTEM DESCRIPTION

A. Provide an extension to the existing microprocessor controlled, intelligent reporting fire alarm system Honeywell EBI network serving the Capitol Complex, as shown on the drawings and specified herein. The system shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Network Fire Alarm Control Panels (FACP), Network Reporting Nodes, (NRN), Network Liquid Crystal Displays (NLCD), auxiliary control devices, remote power supplies, remote annunciators, emergency voice/alarm communication equipment, and wiring. All fire alarm equipment shall be provided to form a complete, U.L. listed, coordinated system, ready for operation.

B. Any auxiliary control panels provided under the current project scope shall be connected to the main FACP in a peer to peer configuration. All panels shall be connected as one continuous network. Remote panels shall be distributed in a manner which provides monitoring and control output capability from each respective remote panel. Each panel shall be a stand-alone NFPA 72 compliant control panel. Panels that are unable to communicate to the next control panel shall transmit back to the previous panel to maintain communications to the fire alarm network and shall communicate the status of the disconnected panel to the fire alarm network.

C. Control Equipment:
   1. The Fire Alarm Control Panel (FACP) that is programmed to monitor and control all of the building fire alarm devices and emergency voice control equipment, and a Fire Alarm Network Reporting Terminal shall be located in the Fire Command Room.
      a. The Fire Alarm Contractor shall provide all firmware and software as required to establish a fully functional monitoring and control interface to the Fire Alarm Network Reporting Terminal. All interface equipment provisions, equipment connections, software integration, equipment support, and site coordination shall be the responsibility of the Fire Alarm Contractor.
         1) Provide a Graphic User Interface (GUI) software program for management of the fire alarm system from the Network Reporting Terminal. GUI application shall be expressly created and marketed by the manufacturer of the fire alarm system, and shall be U.L. listed for the intended purpose.
   2. The Fire Alarm Contractor shall provide an uninterruptible power supply (UPS) for connection to the Network Reporting Terminal. The UPS power supply shall be capable of operating the Network Reporting Terminal for a minimum of fifteen (15) minutes.
   3. Alarm acknowledging, alarm silencing and system resetting shall be accomplished only from the main building FACP or Network Reporting Terminal in the Fire Command Room. The system shall only be reset by factory trained and authorized personnel for the installed system. These three (3) functions shall be password protected.

D. System Supervision: The system shall be electrically supervised and monitor the integrity of all conductors. Each designated initiating point shall simultaneously transmit separate and distinct alarm, supervisory and trouble signals to the fire alarm network.

E. System Monitoring: Provide a digital communicator to connect to Owner provided telephone circuits. Provide 3 output zones, (1) sprinkler waterflow, (2) supervisory signal, (3) alarm other than waterflow.

F. System Wiring Connections: The system shall be a proprietary, low voltage, closed circuit, electrically supervised, non-coded, continuous sounding type as described in NFPA 72. Circuit type and supervision shall be Class A for the fire alarm network connections, Class B for Signaling Line Circuits (SLC's) from the control panels to the initiation devices, and Class B for the Notification Appliance Circuits (NAC's).

G. System Capacities: Maintain spare capacity on all system Signaling Line Circuits (SLC's) and Notification Appliance Circuits (NAC's). The following spare capacities shall be maintained:
   1. 25% spare capacity for connected intelligent devices on each individual SLC circuit.
   2. 25% spare power capacity (in amps) on each individual NAC circuit.
   3. 25% spare power capacity (in watts) on each individual voice paging circuit.

H. Audible Alarm Indication:

1. The system shall include a multiplexed emergency voice alarm communication system utilizing distributed amplification and intelligence such that loss of operation by the main emergency control panel will not result in the loss of evacuation signal throughout the balance of the building. Provide remote amplifiers distributed throughout the building as indicated on the construction documents. Connect the speakers on each level to their respective floor amplifier. Provide 25% spare wattage capacity in every amplifier. Provide a distributed standby amplifier for every five (5) primary operating amplifiers. The system shall feature automatic switchover to a standby amplifier in the event of any primary amplifier failure. Amplifiers shall feature volume controls, concealed behind locking or screw-on covers. Amplifiers shall be current limited and constantly monitored.
2. Pre-recorded messages shall originate from a solid state storage device. Failure of the message system shall result in automatic takeover by alarm tone signal. Voice system will be single channel in design.
3. The digitized voice messages shall be recorded exclusively for the building per the Owner's requirements, and shall be factory recorded utilizing a female voice. All messages will be custom programmed to match the building owner's requirements. The message shall notify building occupants that a fire condition has been detected. The message will automatically identify the specific floor location from which the alarm originated. Generalized alarm messages, which do not specifically identify the alarm floor location within the text of the message, are not acceptable.
4. Provide four (4) tones to allow four (4) unique events from the system.
5. Emergency manual voice override shall be provided in the main building FACP.
6. Provide zoned, selective emergency one-way paging capability in the main building FACP. The system shall feature dual microphone preamplifiers and spare power amplifiers for redundancy. The system shall include a hand held type microphone with push-to-talk switch. The microphone cable shall be permanently connected to the control panel. The control panel shall contain controls to permit manual selection of paging zones for microphone announcements to a single zone, all zones, or any combination of communication zones simultaneously. Operation of the system microphone push-to-talk switch shall pre-empt any alarm tone or pre-recorded message in the selected communication zone. System pre-amplifier shall be supervised. Any pre-amplifier failure shall automatically cause a standby pre-amplifier to be substituted and cause a trouble indication on the main control panel.
7. The amplifier monitoring system shall consist of any UL listed method that does not result in an audible output in the system speakers, but will cause a trouble signal upon detection of any failure which would interfere with amplification and reproduction of alarm tones and evacuation messages. Detection of an amplifier failure shall automatically cause substitution of a standby amplifier and shall activate the trouble indicator and audible signal at the fire alarm network.
8. Audible notification system Speaker units shall be white in color.

I. Visual Alarm Indication: Complete building visual xenon-strobe type units to provide a synchronized flash rate. The strobe units will conform to the light intensities as indicated on the drawings.

1. Visual notification system Strobe units shall be painted to match surrounding finishes.
2. System Monitoring: The system shall be monitored on site at the Surveillance Room.

J. Interface to other Sections: The fire alarm system contractor shall be responsible for coordination with all Division 21000, 22000, and 23000 contractors for fire protection and suppression system interfaces, as well as the required interface between the fire alarm system and the Building Management System (BMS). This coordination shall include, as a minimum, preaction sprinkler systems, deluge suppression systems, and all other fire protection systems (wet and dry sprinkler systems). The contractor shall provide all necessary devices, wiring, etc.

K. Fire Protection Systems:

1. The system shall monitor the status of the building wet and dry sprinkler fire protection systems. Three levels of monitoring shall be provided:
   a. Alarm: activated when a water flow condition is detected.
   b. Supervisory: activated when a gate valve is closed indicating a tamper switch is activated.
   c. Supervisory: activated when an off - normal system air pressure signal is detected.
   d. Trouble - activated when a short, open, or other fault is detected on the initiation circuit.

L. The system shall control the fire protection sprinkler system exterior horn/strobe. Activation of water flow indicating switch shall automatically activate the exterior horn/strobe. The horn/strobe shall be connected to a non-silenceable circuit so that anytime a water flow condition is detected, the horn/strobe will operate regardless of the status of the fire alarm system. All wiring shall be supervised and the horn/strobe shall operate on 24 VDC power from the fire alarm system.

M. The system shall include interface monitor points at the building fire pump controller for monitoring of the following points:
   1. Fire Pump Running condition.
   2. Loss of line power on the Line Side of the Motor Starter in any Phase.
   3. Phase Reversal on the Line Side of the Motor Starter.
   4. Control Circuit Trouble signal.
   5. Backup Power Transfer Switch Position.
   6. Controller connected to Alternate Source.

N. Interface to the Building Management and Control System:
   1. The fire alarm system shall include dry contact interfaces to the building BMS System for indication of HVAC fan shutdown.

O. Elevator Hoistway Damper Control:
   1. Provide remote switches for manual activation of Division 15 elevator hoistway dampers. Provide one (1) switch for each individual hoistway damper.
      a. Switch activation shall initiate a dry-contact closure at the corresponding Division 15 elevator hoistway damper.
      b. Damper position shall be monitored via dry-contact connection to the damper end switch, which is provided by Division 15.
   2. Each individual switch shall consist of the following:
      a. A two-position keyed switch.
         1) The switch key shall not be removable when the switch is in the open position.
      b. Permanent engraving, indicating “Elevator Hoistway Damper Control”, with the appropriate elevator hoistway designation.
      c. A lighted indicator on the keyed switch to signal open position of the associated hoistway damper.

P. Smoke Damper Control: The system shall automatically close smoke dampers if smoke is detected in the associated duct. Duct mounted smoke detectors shall transmit a supervisory signal to the fire alarm network. The network shall then activate an addressable control module that shall interface to the damper control switch. Provide one addressable control module for each damper. Provide 120 volt power as indicated in the construction drawings, and connect to damper controller. Control shall be such that dampers fail closed.

Q. Fan Shutdown: The system shall automatically shut down HVAC systems if smoke is detected in the main supply or return ducts of the unit. Duct mounted smoke detectors shall transmit a supervisory signal to the fire alarm network. The network shall then activate an addressable control module that shall interface to the fan control circuit.

R. Security System Interface: The system shall include the following interfaces to the building access control/security system:
   1. Automatic Door Release
      a. Provide programmable control modules to interface to security panels for unlocking of all required special egress doors. Provide one (1) control output per building floor. Upon alarm initiation, the system shall automatically activate the control modules, which will cause the security system to disconnect power to the affected locks causing them to unlock.
   2. Automatic Door Closure
   3. Provide programmable monitoring modules to interface to the security system for automatic release of magnetic door holders. Provide one (1) monitoring input per building floor per occupancy separation. The security system shall initiate a signal for door holder release. The fire alarm system shall monitor this signal via monitoring modules, and shall activate the appropriate fire alarm control module(s), which are connected to door holder power circuits.

S. Automatic Door Closing:

1. The fire alarm system shall feature smoke detectors for control of magnetically held-open doors. Detectors shall be installed on the centerline of the doorway opening, minimum of one foot (1'), and maximum of five feet (5') from the doors.
2. The fire alarm system shall include connections for automatic control by the fire alarm system. Only the respective smoke detector adjacent to the door shall initiate automatic door closing.

T. Elevator Recall: The system shall automatically recall elevators by bank to the designated floor or the designated alternate floor when a smoke detector is activated in elevator lobbies or elevator equipment rooms. To accomplish this, the system shall include addressable control modules at each of the elevator controllers. All wiring shall be supervised.

1.5 SUBMITTALS

A. General Submittal Requirements:
   1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
   2. Shop Drawings shall be prepared by persons with the following qualifications:
      a. Trained and certified by manufacturer in fire-alarm system design.
      b. NICET-certified fire-alarm technician, Level III minimum.
         1) Include NICET designers certification number, level and area of sub-classification, and full name with signature.
      c. Licensed or certified by authorities having jurisdiction.

B. Product Data: For each type of product indicated.

C. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.
   1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire-alarm Systems" Chapter in NFPA 72.
   2. Include voltage drop calculations for notification appliance circuits.
   3. Include battery-size calculations.
   4. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
   5. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
   6. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
   7. Include scaled floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.

D. Qualification Data: For qualified Installer.

E. Field quality-control reports.

F. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
   1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
   2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
   3. Record copy of site-specific software.
   4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:
      a. Frequency of testing of installed components.
      b. Frequency of inspection of installed components.
      c. Requirements and recommendations related to results of maintenance.
      d. Manufacturer's user training manuals.

5. Manufacturer's required maintenance related to system warranty requirements.
6. Abbreviated operating instructions for mounting at Fire Alarm Control Panel.

G. Software and Firmware Operational Documentation:
1. Software operating and upgrade manuals.
2. Program Software Backup: On compact disk or DVD-ROM, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project. Installation shall be by personnel certified by NICET as fire-alarm Level III technician.

B. 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.

C. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
1. Notify Construction Manager no fewer than ten (10) days in advance of proposed interruption of fire-alarm service.
2. Do not proceed with interruption of fire-alarm service without Construction Manager's & Owner's written permission

1.8 SEQUENCING AND SCHEDULING

A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.

B. Construction Monitoring: Coordination between all disciplines and Capitol Security monitoring station operators shall be required for the duration of the project. The fire alarm system shall NOT be placed into bypass during construction. The system operators shall be made aware of the fire alarm system contractor’s demolition and installation plans on a daily basis. The intention is to provide real-time awareness of any trouble signals that may indicate that fire alarm system continuity has been jeopardized. In the event

C. Equipment Removal: After acceptance of the new fire-alarm system, remove existing disconnected fire-alarm equipment.

1.9 SOFTWARE SERVICE AGREEMENT

A. Comply with UL 864.

B. Technical Support: Beginning with Substantial Completion, provide software support for two (2) years.

C. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two (2) years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
1. Provide thirty (30) days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer:

1. Honeywell

2.2 SYSTEM OPERATIONAL DESCRIPTION

A. Operation Matrix

Initiating Device	**A**	**B**		**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Spot type smoke detector.	X_1	X_1	X_1	X	–	–	–	–	–	–	–
Smoke detector - elevator lobby or elevator equipment room.	X_1	X_1	X_1	X	–	–	–	X	–	–	–
Spot type smoke detector at associated smoke barrier	X_1	X_1	X_1	–	–	–	–	–	–	X	X
In-Duct Smoke Detector – Fan.	X_2	X_2	X_2	–	–	X	–	–	–	–	–
In-Duct Smoke Detector – Damper.	X_2	X_2	X_2	–	X	X	–	–	–	–	–
Wet sprinkler water flow alarm.	X_1	X_1	X_1	X	–	–	X	–	X	X	–
Sprinkler valve tamper.	X_2	X_2	X_2	–	–	–	–	–	–	–	–
Dry pipe sprinkler system high/low air pressure.	X_2	X_2	X_2	–	–	–	–	–	–	–	–
Fire Pump Running.	X_2	X_2	X_2	–	–	–	–	–	–	–	–
Loss of Phase on the Line Side of the motor contactor in any Phase.	X_2	X_2	X_2	–	–	–	–	–	–	–	–
Phase Reversal on the Line Side of the Motor Starter.	X_2	X_2	X_2	–	–	–	–	–	–	–	–
Fire pump control circuit Trouble.	X_3	X_3	X_3	–	–	–	–	–	–	–	–
Generator fire detection and suppression panel-Alarm	X_1	X_1	X_1	–	–	–	–	–	–	–	–
Generator fire detection and suppression panel-Fire Detected	X_1	X_1	X_1	–	–	–	–	–	–	–	–
Generator fire detection and suppression panel-Trouble	X_2	X_2	X_2	–	–	–	–	–	–	–	–
System Trouble	X_3	X_3	X_3	–	–	–	–	–	–	–	–
Control Panel AC Power Loss.	X_3	X_3	X_3	–	–	–	–	–	–	–	–

TYPE of SIGNAL

X_1 = Alarm Signal
X_2 = Common supervisory signal.
X_3 = Common trouble signal.
– = Action not required.

SYSTEM OPERATION

A = Annunciate at FACP.
B = Annuciate at FAAP.
C = Annunciate at Network Reporting Terminal (in Monitoring Room).
D = Activate notification appliances as described in specification.
E = Activate relay to close damper.
F = Activate relay to discontinue AHU fan.
G = Activate Exterior Horn/Strobe.
H = Recall elevator(s) in designated bank.
I = Discontinue operation of all building fans and close all smoke dampers.
J = Release the adjacent held open smoke door.
K = Initiate atrium smoke purge

2.3 FIRE ALARM CONTROL PANEL

A. General Requirements for Fire Alarm Control Panel:

1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864 and listed and labeled by an NRTL.
   a. System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
   b. Include a real-time clock for time annotation of events on the event recorder and printer.
   c. All programming or editing of an existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the Fire Alarm Control Panel.
2. Capacity:

a. The control panel shall provide the total number of indicated intelligent devices and minimum 50% spare capacity. The fire alarm system will be capable of providing expansion through additional networked control panels providing a total system capacity of a minimum of 200,000 intelligent/addressable points.

3. Addressable initiation devices that communicate device identity and status.
   a. Smoke sensors shall additionally communicate sensitivity setting and allow for adjustment of sensitivity at Fire Alarm Control Panel.
   b. Temperature sensors shall additionally test for and communicate the sensitivity range of the device.
4. Addressable control circuits for operation of mechanical equipment.

B. The Fire Alarm Control Panel shall provide the following features:
   1. Supervise and monitor all intelligent/analog detectors and monitor modules connected to the system for normal, supervisory, trouble and alarm conditions.
   2. Supervise all initiating signaling and notification circuits throughout the facility.
   3. Detect the activation of any initiating device and the location of the alarm condition. Operate all notification appliances and auxiliary devices as programmed.
   4. Visually and audibly annunciate any trouble, supervisory or alarm condition on the panel display.
      a. Maximum response time for alarms shall be 5 sec.
      b. Maximum time for trouble signals shall be 200 sec.
   5. Drift Compensation to extend detector accuracy over life.
   6. Sensitivity Test, meeting requirements of NFPA 72.
   7. Maintenance Alert to warn of excessive compensation.
   8. System Status reports to display.
   9. Periodic Detector Test conducted automatically by software.
   10. Cross-zone software counting.
   11. Temporal Coding.
   12. Control-By-Time for non-fire operations, with holidays.
   13. Day/Night automatic adjustment of detector sensitivity.
   14. Disable detectors from the system during construction periods through password protected software. Trouble condition shall be automatically transmitted.
   15. A clear distinction between the integral alarm audible signal and the trouble audible signal.

C. Alphanumeric Display and System Controls: Arranged for interface between human operator at Fire Alarm Control Panel and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
   1. The Fire Alarm Control Panel shall include an operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display, individual color coded system status LED's, and a keypad.
   2. Annunciator and Display: Liquid-crystal type, 3 line(s) of 80 characters, minimum
   3. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

D. Circuits:
   1. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class B.

E. Notification Appliance Circuit: Operation shall sound in a code approved method

F. Elevator Recall:
   1. Smoke detectors at the following locations shall initiate automatic elevator recall:
      a. Elevator lobby detectors except the lobby detector on the designated floor.
      b. Smoke detector in elevator machine room.
      c. Smoke detectors in elevator hoistway.
   2. Elevator lobby detectors located on the designated recall floors shall be programmed to move the cars to the alternate recall floor.
   3. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.
      a. Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.

G. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke barrier walls shall be connected to fire-alarm system.

H. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.

I. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.

J. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided in a separate cabinet located in the security command center.

1. Indicated number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall comply with UL 1711 and be listed by an NRTL.
   a. Allow the application of and evacuation signal to indicated number of zones and, at same time, allow voice paging to the other zones selectively or in any combination.
   b. Programmable tone and message sequence selection.
   c. Standard digitally recorded messages for "Evacuation" and "All Clear."
   d. Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification appliance circuits of Fire Alarm Control Panel.
2. Status Annunciator: Indicate the status of various voice/alarm speaker zones and the status of firefighters' two-way telephone communication zones.
3. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.

K. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble) and date and time of occurrence. Differentiate alarm signals from all other printed indications. Also print system reset event, including same information for device, location, date, and time. Commands initiate the printing of a list of existing alarm, supervisory, and trouble conditions in the system and a historical log of events.

L. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, [supervisory signals] [supervisory and digital alarm communicator transmitters] [and] [digital alarm radio transmitters] shall be powered by 24-V dc source.

1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

M. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.

1. Batteries: Sealed gel or lead calcium.
2. Standby batteries shall be capable of operating the fire alarm system for a minimum of twenty-four (24) hours and then operating all indicating units for ten (10) minutes.
3. A battery charging system shall be included. The battery charger shall be fully automatic, current limited, constant voltage type. The charging rate shall be variable from a suitable trickle charge to a high rate depending on the battery condition. The charger shall be capable of recharging the batteries within 24 hours to rated voltage after discharge to 87½% of nominal voltage.

N. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

O. Fire Alarm Control Panel Hardware: Provide Honeywell XLS 3000 Fire Alarm Control Panel.

2.4 NETWORK REPORTING TERMINAL

A. The network reporting terminal shall be a Windows™ compatible, Intel Dual core class computer, minimum 1.5 GHz processor, with a minimum 250 GB hard drive, minimum 4GB RAM, minimum XVGA monitor, minimum 16x DVD-RW drive, keyboard and mouse control.

B. The network reporting terminal shall provide a visual display and an audible alert of all changes in status of the system and shall annotate such displays with the current time-of-day and date.

C. The terminal display shall be 20" and enclosed in a cabinet suitable for installation in a security command console. Coordinate with the Electrical Contractor for installation of the terminal in the command console.

D. A detachable keyboard shall be provided with the terminal that may be used for programming, testing, and control of the system. Individual keys shall be provided on the keyboard for the ACKNOWLEDGE, RESET, LAMP TEST, SYSTEM TEST, and SIGNAL SILENCE functions of the fire alarm network.

E. The terminal shall maintain a cumulative count of all alarm signals, supervisory signals, and trouble signals in the system as well as a count of all alarms and troubles requiring acknowledgment. These counts shall be continuously displayed during all FACP operations.

2.5 COLOR GRAPHICS ANNUNCIATION SYSTEM

A. The color graphics annunciation system shall be based on a Windows™ compatible operating system.

B. Screens shall be selected automatically on command from the control panel and manually by operator command. The color graphics annunciation system will be totally field-programmable. All of the attributes of the custom graphics screen shall be defined by the user and shall be programmable in the field. The color graphics annunciation screens can consist of any text messages, programmed lines, custom graphic characters, text, flashing or other display attributes, as well as a minimum of two hundred fifty-six (256) screen colors, which shall be initiated by any alarm, supervisory or trouble event. Screens shall be selected for display by automatic vectoring, which is initiated by any change of status within the fire alarm control panel, or through manual selection using the mouse.

C. Provide three (3) screens for each level of the building. The screens shall be field programmable for automatic selection based on Owner preferences, or manually selectable. An additional custom, home page screen will be programmed illustrating the outline of the building, elevation, and text. All screens shall presented to the owner prior to installation for approval.

D. Help screens shall be provided for both the programmer and the operator of the system. The color graphics annunciation system shall not require any specialized computer expertise for normal operation.

E. The color graphics annunciation system shall also feature an event history mode function which may be used to store and display events, such as alarms and troubles, as well as acknowledgements, resets, signal silences, or any other operator/programmer actions. The event history buffer will be able to store, recall, or print any or all of the last 50,000 system events which have occurred. This function may be initiated and defined by the system operator to print all system events between any two specified time indices. The operator may define the start day and time of the printout inquiry, and may also define the stop date and time of the printout inquiry.

2.6 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet boxes. If indicated as surface mounted, provide manufacturer's surface back box.

   1. Double-action mechanism requiring two actions to initiate an alarm; with integral addressable module, arranged to communicate manual-station status (normal, alarm, or trouble) to Fire Alarm Control Panel.
   2. Station Reset: Key- or wrench-operated switch.

3. Indoor Protective Shield: Factory-fabricated clear plastic enclosure, hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.

2.7 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:
   1. Comply with UL 268, operating at 24-V dc, nominal.
   2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to Fire Alarm Control Panel.
   3. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
   4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
   5. Integral Visual-Indicating Light: LED type, indicating detector.

B. Photoelectric Smoke Detectors:
   1. Detector address shall be accessible from Fire Alarm Control Panel and shall be able to identify the detector's location within the system and its sensitivity setting.
   2. An operator at Fire Alarm Control Panel, having the designated access level, shall be able to manually access the following for each detector:
      a. Primary status.
      b. Device type.
      c. Present average value.
      d. Present sensitivity selected.
      e. Sensor range (normal, dirty, etc.).

C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.
   1. Detector address shall be accessible from Fire Alarm Control Panel and shall be able to identify the detector's location within the system and its sensitivity setting.
   2. An operator at Fire Alarm Control Panel, having the designated access level, shall be able to manually access the following for each detector:
      a. Primary status.
      b. Device type.
      c. Present average value.
      d. Present sensitivity selected.
      e. Sensor range (normal, dirty, etc.).
   3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.
   4. Each sensor shall have multiple levels of detection sensitivity.
   5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
   6. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.8 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or rate-of-rise of temperature that exceeds 15 deg F (8 deg C) per minute, unless otherwise indicated.
   1. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to Fire Alarm Control Panel.

2.9 NOTIFICATION APPLIANCES

A. Manufacturer: All notification devices shall be supplied by a single manufacturer, regardless of type.

B. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.

C. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.

1. Rated Light Output:
   a. 15/30/75/110 cd, selectable in the field.
2. Mounting: Wall mounted unless otherwise indicated.
3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
4. Flashing shall be in a temporal pattern, synchronized with other units.
5. Strobe Leads: Factory connected to screw terminals.
6. Mounting Faceplate: Factory finished, painted to match surrounding finishes.

D. Voice/Tone Notification Appliances:

1. Appliances shall comply with UL 1480 and shall be listed and labeled by an NRTL.
2. High-Range Units: Rated 2 to 15 W.
3. Low-Range Units: Rated 1 to 2 W.
4. Matching Transformers: Tap range matched to the acoustical environment of speaker location.

2.10 REMOTE DEVICE LOCATION-INDICATING LIGHTS AND IDENTIFICATION PLATES

A. Remote status and alarm indicator and test stations, with LED indicating lights. Light is connected to flash when the associated device is in an alarm or trouble mode. Lamp is flush mounted in a single gang wall plate. A red, laminated, phenolic-resin identification plate at the indicating light identifies, in engraved white letters, device initiating the signal and room where the smoke detector or valve is located. For water-flow switches, the identification plate also designates protected spaces downstream from the water-flow switch.

B. The indicators shall be provided for every concealed spot and duct mounted smoke detector.

2.11 MAGNETIC DOOR HOLDERS

A. Connection: Provide connection to the fire-alarm system door holders provided under Division 08. Coordinate location, rough-in requirements, and voltage with hardware supplier.

B. Provide a local switch for hold open release.

2.12 REMOTE ANNUNCIATOR

A. Description: Annunciator functions shall match those of Fire Alarm Control Panel for alarm, supervisory, and trouble indications. Manual switching functions shall match those of Fire Alarm Control Panel, including acknowledging, silencing, resetting, and testing.

1. Mounting: Flush cabinet, NEMA 250, Class 1.

2.13 ADDRESSABLE INTERFACE DEVICE

A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.

B. The power shall be directly from the data circuits. No additional power will be required.

C. The module shall include an LED, installed on the faceplate, which shall blink on when polled by the main control panel. Upon activation of the module, the LED shall light continuously.

D. Provide an engraved, permanent label with each monitor module to identify the device monitored by the module.

2.14 CONTROL MODULE

A. The control module shall provide an interface control relay to other systems. Relay contacts shall be DPDT rated at 2 amps at 28 volts DC.

B. The module shall include an LED that shall blink on when being polled by the main control panel. Upon activation of the module, the LED shall light continuously.

C. The module shall include addressable technology that shall operate the module on the same wiring loop as the alarm initiating devices.

2.15 SYSTEM PRINTER

A. Printer shall be listed and labeled by an NRTL as an integral part of the fire-alarm system.

2.16 WIRE AND CABLE

A. All fire alarm system wiring shall be new.

B. All wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross-sectional area where three (3) or more cables are contained within a single conduit. Conduit shall be used in all walls, open exposed areas and in all inaccessible ceiling spaces.

C. Wiring shall be in accordance with local, state and national codes NEC Article 760 and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Notification Device Circuits and Signaling Line Circuits, and 14 AWG (1.32 mm) for Indicating Appliance Circuits.

D. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Comply with NFPA 72 for installation of fire-alarm equipment.

B. Equipment Mounting: Install Fire Alarm Control Panel on finished floor with tops of cabinets not more than 72 inches (1830 mm) above the finished floor.

C. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.

1. Connect new equipment to the existing control panel in the existing part of the building.
2. Connect new equipment to the existing monitoring equipment at the Supervising Station.
3. Expand, modify, and supplement the existing] equipment as necessary to extend the existing monitoring functions to the new points. New components shall be capable of merging with the existing configuration without degrading the performance of either system.

D. Smoke-or Heat-Detector Spacing:

1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing
3. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A in NFPA 72.
4. HVAC: Locate detectors not closer than 3 feet (1 m) from air-supply diffuser or return-air opening.
5. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture.

E. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of the duct.

F. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.

G. Audible appliances:

1. May be installed surface or semi-flush mounting for indoors applications. Semi-flush installation shall mount to standard electrical hardware requiring no additional trimplate or adapter. The aesthetic appearance shall not have any mounting holes or screw heads visible when the installation is completed. Provide ceiling tile bridges for any suspended ceiling installed audible devices.
2. Install not less than 80 inches above the finished floor or more than 96 inches above the finished floor. Install not less than 6 inches below the ceiling. Install bells and horns on flush mounted back boxes with the device operating mechanism concealed behind a grille or as indicated.

H. Audible/visual appliances: Installed indoors for surface or semi-flush mounting. Semi-flush installations shall mount to standard electrical hardware requiring no additional trimplate or adapter. The aesthetic appearance shall not have any mounting holes or screw heads visible when the installation is completed. The audible device may be installed indoors or outdoor with the proper backbox. Provide ceiling T-bar supports for any suspended ceiling installations.

I. Visual Alarm Indicating Devices: The strobes shall be installed indoors for flush mounting. Semi-flush units shall mount to standard electrical hardware requiring no additional trimplate or adapter. Provide T-bar supports as required for suspended ceiling installations

J. Device Location-Indicating Lights: Locate in public space near the device they monitor.

K. Fire Alarm Control Panel: Surface mounted, with tops of cabinets not more than 72 inches (1830 mm) above the finished floor.

L. Annunciator: Install with top of panel not more than 72 inches (1830 mm) above the finished floor

M. Provide microelectronic monitor modules with 120V relays for each smoke damper connection to provide individual programmed control of damper(s).

N. Provide microelectronic monitor modules for elevator controller to initiate elevator recall.

3.2 WIRING INSTALLATION

A. Install wiring according to the following:

1. NECA 1.
2. TIA/EIA 568-A

B. Wiring Method: Install power limited fire-alarm circuits exposed, in raceways, or fished in concealed spaces including walls and ceilings.

1. Cables and raceways used for fire-alarm circuits, and equipment control wiring associated with the fire-alarm system, may not contain any other wire or cable.
3. Fire-Rated Cables: Use of 2-hour fire-rated fire-alarm cables, NFPA 70 Types MI and CI, is not permitted.
4. Signaling Line Circuits: Power-limited fire-alarm cables shall not be installed in the same cable or raceway as signaling line circuits
5. Cable splices or terminations shall be made in listed fittings, boxes, enclosures, fire-alarm devices, or utilization equipment.
6. Where installed exposed, cables shall be adequately supported and installed in such a way that maximum protection against physical damage is afforded by building construction such as baseboards, door frames, ledges, and so forth.
7. In new construction, all wall devices shall be installed with wiring through conduit stubs and flush backboxes.
8. In existing construction, all wall devices shall be installed with wiring through fished through walls with flush cut-in boxes.
9. Refer to NEC Article 760 for all wiring installation requirements.

B. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by the manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire-alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

C. Cable Taps: Use numbered terminal strips in junction, pull and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

D. Color-Coding: Color-code fire-alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire-alarm system junction boxes and covers red.

E. Risers: Install at least two vertical cable risers to serve the fire-alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signal from other floors or zones.

F. Wiring to Remote Alarm Transmitting Device: 1-inch (25-mm) conduit between the FACP and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.3 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware." Connect hardware and devices to fire-alarm system.

1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet (1 m) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Smoke dampers in air ducts of designated air-conditioning duct systems.
2. Alarm-initiating connection to elevator recall system and components.
3. Alarm-initiating connection to activate emergency lighting control.
4. Supervisory connections at valve supervisory switches.
5. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
6. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
7. Supervisory connections at fire-pump engine control panel.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

B. Install framed instructions in a location visible from Fire Alarm Control Panel.

3.5 GROUNDING

A. Ground Fire Alarm Control Panel and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to Fire Alarm Control Panel.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:
   1. Visual Inspection: Conduct visual inspection prior to testing.
      a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire-alarm Systems" Chapter.
      b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
   2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
   3. Factory-authorized service representative shall prepare the "Fire-alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire-alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

C. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

D. Fire-alarm system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

F. A completed test form and a letter certifying that the installation is complete and fully operable and tested shall be forwarded to the Engineer. The letter shall include the names and titles of witnesses of the preliminary tests.

G. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

H. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.7 DEMONSTRATION

A. Without additional expense to the Owner, the Contractor shall provide a competent control equipment manufacturer or his authorized representative personnel to give instruction for the care, adjustment, and operation of all parts of the system to the Owner's employees, designated by the authorized representative, who are to have charge of the equipment.

B. Each instructor shall be thoroughly familiar with all parts of the installation on which he is to give instruction and shall be factory trained and certified in operating theory as well as in practical operation and maintenance work. The instructor will issue documentation at the completion of training, certifying that the attendees have demonstrated sufficient knowledge of the system.

C. Furnish twelve (12) hours of instruction after acceptance of the system at the date and time selected by the Owner.

END OF SECTION

SECTION 285123
INTERCOM SYSTEM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Microprocessor-switched intercommunications and program systems with the following components:
   1. Master stations.
   2. Sub-Stations.
   3. Exchange/Server.
   4. Conductors and cables.
   5. Raceways.
   6. Backboxes.

1.3 SYSTEM DESCRIPTION

A. General:
   1. The Call for Assistance (CFA) Intercom system shall consist of remote sub-stations and masters connected to exchanges/servers in telecommunications systems.
   2. The calls shall be received at master stations in locations described herein.

B. The exchanges/servers shall be connected through the fiber optic backbone to the head-end at the Security and Monitoring facility at the basement level.
   1. Exchanges/Servers shall communicate on an IP-based platform.

C. Interface to other systems:
   1. The CFA system shall interface with the Video Surveillance System to call up the nearest camera upon activation of a station. The programming shall be through contact closure based interfaces.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For intercommunications and program systems. Include plans, elevations, sections, details, and attachments to other work.
   1. Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location and size of each field connection.
   2. Wiring Diagrams: For power, signal, and control wiring.
      a. Identify terminals to facilitate installation, operation, and maintenance.
      b. One Line Riser Drawing: Indicate all system components, all interconnecting wiring, power connections, wiring type, all connections to interfaced equipment. All system components will be identified with the room or door location. Typical riser drawings which do not reflect the actual project requirements, or a riser drawing indicating only partial equipment are not acceptable. Provide riser drawing on 30" x 42" drawing
      c. Scaled plans indicating devices, cable runs, and headend equipment.

C. Qualification Data: For qualified Installers.

D. Field quality-control reports.

E. Operation and Maintenance Data: For intercommunications and program systems to include in operation and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Scaled drawings of the facility showing station locations and addresses.
2. Sorted list of all station locations and addresses.

F. A record of Owner's equipment-programming option decisions.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. The CFA system contractor shall supply information attesting to the fact that their firm is an authorized product dealer for the system proposed.

C. The CFA system integrator shall provide a minimum of three (3) references whose systems are of similar complexity and have been installed and maintained by the CFA system contractor in the last five (5) years.

D. 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.

E. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate layout and installation of ceiling-mounted speaker microphones 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. Manufacturers:

1. Zenitel USA; STENTOFON brand products.

2.2 SYSTEM DESCRIPTION

A. The purpose of the Intercom System shall be to provide two-way (hands-free at both ends) voice communication as required to provide instant intercommunications for employees and visitors. System shall assist with personal safety, facility security, security systems integration, operational efficiency and maintenance functions.

B. The system shall be a microprocessor controlled, fully "digital", PC programmable, central switching exchange/server type using individual cables from the exchange/server to each station. The system shall be capable of automatic hands-free operation, without the use of handsets, at both the initiating and receiving station, and each station shall include a condenser microphone and preamplifier. The exchange/server shall include a data connection capabilities with IP-based Ethernet, serial data ports, RS-232, RS-422 and RS485 type, both input and output, for direct transfer of call processing functions to and from external microprocessor controlled equipment such as access control, video surveillance switchers, remote control boards and audio amplifiers.

C. System capacity shall include a modular exchange/server cabinets wired and equipped for: 150 stations/numbers minimum. The system shall have the capability to be expanded to multi-node operation with remote sites, using transparent dialing between remote nodes.

D. A complete operational system shall be provided. The system functions in public areas such as elevators, canopies and lobbies shall comply with ADA requirements.

E. Interface to other systems: The

2.3 SYSTEM CONFIGURATION

A. The central exchange/server, power supplies, interfaces, accessories, and main distribution board, shall be located in an appropriate secure telecom room.

B. System shall consist of desk mounted master stations with direct access buttons and LCD displays, located in the security command center. Each master shall be capable of calling all other stations in the system unless specifically blocked or restricted through programming. Existing master stations are located at the Owner's off-site Security Monitoring Stations.

C. Substations shall be flush or surface mounted, tamper and weather resistant where needed and located as required for direct access calling to security command center masters. Elevator car substations shall be installed by the elevator company.

D. Exterior substations shall be provided with emergency indicator strobe to assist with locating. Strobe shall flash upon call request.

E. All features and functions shall be programmed on site with a standard PC.

2.4 SYSTEM CONFIGURATION

A. MASTER CALLS. A call shall be placed from any master station to any other station in the system, unless specifically blocked, by touch dialing the appropriate number of the desired station, or using one of the direct access buttons

B. SUBSTATION CALLS. Each Substation shall be programmed to call a specific master station. Pressing button on substation shall provide call request verification by blinking LED on station and giving a call registered message. A substation "call-request" call shall be identified on a display master, with text message, or flash an associated LED and sound a unique tone.

C. DIRECT ACCESS BUTTONS. All master stations shall include (10) direct access buttons, programmed for direct access calling, to allow single button speed dialing of other stations, features or telephone lines. Each direct access button shall be easily programmed by station user any time

D. ALL-CALL. All master stations shall be able to initiate an all-call page to all other stations in the system. It shall be possible to remove stations, through programming, from receiving all-call and restrict any station from initiating an all-call. Selected stations shall receive all-call announcements at full volume, regardless of station volume setting.

E. FAULT/ALARM LOGGING. System shall provide data output to allow printout of fault conditions within the system (faulty boards, wiring or software), and external alarm conditions input through the intercom system (prints time and source of alarm).

2.5 SYSTEM OPERATION

A. MASTER-TO MASTER CALLS. All masters shall be able to call all other masters in their system individually, point to point, unless blocked through programming, by simply touch dialing a 1, 2, 3 or 4 digit number, or by using direct access buttons. Once dialed, both stations shall be able to converse "hands free". All standard features listed shall be available to all masters.

B. CALL FROM SECURITY SUBSTATION TO Security Command Center MASTER. A call request shall be initiated from a substation by activating an alarm button, or the call-in button on the substation. It shall be possible to also start an external strobe light (see options). This call request shall be annunciated at the Master station as follows:

1. The call request shall be indicated in the LCD display with number and text to identify the calling substation.
2. Upon initiation of a call, the central exchange/server shall initiate a video surveillance camera call up at the Video Surveillance System.

C. A rapidly repeating tone signal sounds (programmable tone). Call request shall be answered at the CRM by pressing appropriate direct access button. When call is answered the following shall occur:

1. A connection tone is heard at both the Master Station and the calling station.
2. The Number and Text of the station that is connected appears on the top line of the LCD display.
3. An in-use LED illuminates on the calling substation.
4. Clear, two-way communication shall take place.
5. Other calls from substations to the Master station shall appear in queue and sound the call-in tone.

D. CALL FROM A MASTER STATION TO ANY OTHER STATION. A call shall be placed from a Master station to any other station in the system by simply dialing the station number on the digit keypad. LCD screen on the Master station shall indicate the number and text of the called station. When calling any other master station, “duplex” hands-free communication shall be possible between the two stations. When calling an elevator car, or other security substation, the press-to-talk button shall be used to control the conversation, if needed.

2.6 GENERAL REQUIREMENTS FOR EQUIPMENT AND MATERIALS

A. Coordinate features to form an integrated system. Match components and interconnections for optimum performance of specified functions.

B. Expansion Capability: Increase number of stations in the future by twenty five (25) percent above those indicated without adding any internal or external components or main trunk cable conductors.

C. Equipment: Modular type using solid-state components, fully rated for continuous duty, unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz.

D. Weather-Resistant Equipment: Listed and labeled by an NRTL for duty outdoors or in damp locations.

2.7 EQUIPMENT

A. MASTER STATION. Compact desk top console master shall include a speaker, condenser gooseneck microphone with preamplifier and automatic sensitivity adjustment, dial keypad with cancel button, privacy switch, alphanumeric, backlit LCD display. Station name and/or number shown on the alphanumeric display at a master station shall identify calls, call requests, emergency calls, alarms and status of inputs.

B. SECURITY SUBSTATION (Elevator Lobbies, Circulation Towers). Shall be a tamper resistant, electronic substation with large red push button, a speaker, an electret condenser microphone with preamplifier mounted on an anodized aluminum face plate. The call button shall be programmed to call a specific master. Shall mount on a standard (2) gang deep electrical backbox. The minimum frequency range shall be 200-7000Hz. On board relay for control of local devices/strobes.

C. EXTERIOR TAMPER-RESISTANT SUBSTATION. Shall function similar to the security substation described above with push button shall be a large conspicuous red "mushroom" button and station shall be mounted on a aluminum plate designed to withstand extreme abuse. Moisture resistant speaker and microphone shall be mounted behind two offset grills, milled into aluminum block to prevent damage from foreign material or water. The electronic board shall be encased in epoxy and plate shall include a rubberized gasket. The push button shall be made of machined aluminum and the LED of translucent red Lexan. The minimum frequency range shall be 200-7000Hz. On board relay for control of local devices/strobes.

D. ELEVATOR SUBSTATION KIT. Kit shall be functional equivalent of a security substation, without face plate. It shall be designed to mount behind appropriate panel provided by elevator company. Kit shall consist of an electronic preamplifier board, with necessary screw terminals, a speaker and condenser microphone, mounted on a subplate. Call-in button shall be provided by elevator company

E. CENTRAL EXCHANGE/SERVER. The central exchange/server shall provide all control, logic, signaling, switching amplification, power and all operating features listed throughout this specification. All circuitry and components shall be arranged on slide-in printed circuit boards that are 100 percent solid-state, employing latest “state-of-the-art” design. Crossbar, relay, or electro-mechanical switching of any type, will not be acceptable.

1. Expansion to ultimate cabinet capacity shall require only the addition of "Hot Plug in/out" type subscriber/station boards. All subscriber/station boards shall be identical and interchangeable. Malfunction of one subscriber board shall not affect more than six stations. Malfunction of one wire to a subscriber/station board shall not affect more than one station.
2. Each chassis shall support a minimum of 110 subscribers, with an overall system capacity of 5,000 subscribers through multiple chassis.

3. It shall be possible to reprogram the exchange, at the exchange location or remotely through a network connection, and the programming shall take effect immediately. All programmable information shall be protected against power failure and reset, and maintained by “battery back-up.” Battery shall be located on the processor board, and shall be of sufficient capacity to protect program for up to three months after a power failure. It shall be possible to easily connect a PC computer view or print-out the intercom directory and programming.
4. It shall be possible to assign a subscriber dialing numbers of 1-, 2-, 3- or 4 digits in length. The system shall allow programming of direct dialing functions for each subscriber individually.
5. A substation can be programmed to call a specific master station, substation or special features such as “All Call” or “Group Call”.
6. Cabinet shall be rack mounted. Refer to section 275116 for equipment rack specifications.

F. EMERGENCY STROBE AND INDICATOR. Shall be include a constantly glowing blue identification luminaire and blue flash strobe contained in a weathertight and vandal resistant polycarbonate blue dome. The unit shall provide leads capable of activating the strobe when connected to a contact closure and works with substations for both the constant on and emergency strobe function. The unit shall mount to a 2 gang junction box with strobe bracket.

2.8 CONDUCTORS AND CABLES

A. Conductors: Jacketed, twisted pair and twisted multipair, untinned solid copper. Sizes as recommended by system manufacturer, but no smaller than No. 22 AWG.

B. Refer to Div 27 “Structured Cabling” for data cabling.

C. Plenum Cable: Listed and labeled for plenum installation.

2.9 RACEWAYS

A. Intercommunication and Program System Raceways and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems."

B. Flexible metal conduit is prohibited.

C. Provide cast aluminum backboxes in exterior

D. locations. Provide weep hole at lowest interior point of the backbox.

PART 3 EXECUTION

3.0 WIRING METHODS

A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.
   1. Install plenum cable in environmental air spaces, including plenum ceilings.
   2. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems."

B. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.1 INSTALLATION RACEWAYS

A. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.

B. Install manufactured conduit sweeps and long-radius elbows whenever possible

3.2 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements:

1. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at outlets and terminals.
2. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables may not be spliced.
3. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
4. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
5. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
6. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used.

C. Separation of Wires: Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least 12 inches (300 mm) apart for speaker microphones and adjacent parallel power and telephone wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.

3.3 INSTALLATION

A. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.

B. Weatherproof Equipment: For units that are mounted outdoors, in damp locations, or where exposed to weather, install consistent with requirements of weatherproof rating.

C. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.4 GROUNDING

A. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

B. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.

C. Install grounding electrodes as specified in Division 26 Section "Grounding and Bonding for Electrical Systems."

3.5 SYSTEM PROGRAMMING

A. System shall include all software necessary for system configuration.

B. System shall be turned on and adjustments made to meet requirements of specifications and on-site conditions.

C. Programming: Fully brief Owner on available programming options. Record Owner’s decisions and set up initial system program. Prepare a written record of decisions, implementation methodology, and final results.

D. System shall be programmed to function as specified.

E. Directory numbers, feature codes, and special programming shall be documented, printed and made available to owner.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

C. Tests and Inspections:
   1. Schedule tests with at least seven days' advance notice of test performance.
   2. After installing intercommunications and program systems and after electrical circuitry has been energized, test for compliance with requirements.
   3. Operational Test: Test originating station-to-station, all-call, and page messages at each intercommunication station. Verify proper routing and volume levels and that system is free of noise and distortion. Test each available message path from each station on system.

D. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.

E. Intercommunications and program systems will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.

3.7 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.8 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain the intercommunications and program systems.
   1. Train Owner's maintenance personnel on programming equipment for starting up and shutting down, troubleshooting, servicing, and maintaining the system and equipment.
   2. Provide 20 hours of training.

END OF SECTION

SECTION 310000
EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Protection of miscellaneous structures, paved surfaces, curbs and other features to remain.
   2. Protection of trees and other vegetation to remain.
   3. Providing and maintaining erosion control measures and subsequent removal.
   4. Clearing and grubbing of designated trees and vegetation.
   5. Demolition of surface features and proper disposal of demolition materials off-site.
   6. Stripping, stockpiling and subsequent distribution of topsoil.
   7. Excavation, filling, grading, and compaction
   8. Importing of specified soil materials not present on site.
   9. Disposal of excess or unsuitable material off-site.
   10. Maintaining site excavations free of water.
   11. Testing as described herein (Testing Agency retained as per Division 1).

1.2 QUALITY ASSURANCE

A. Utilize equipment of proper size and in good working condition to prosecute the work to full completion in a satisfactory manner.

B. Utilize experienced personnel familiar with the equipment, methods and procedures for the job.

C. Coordinate construction activities with and schedule the Owner's Testing Agency (TA) representative to perform field tests and observations to confirm compliance with this specification. A licensed geotechnical engineer from the TA must observe and approve the subgrade for all foundations, floor slabs and pavement areas.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM), Latest Edition.
   1. ASTM C33-93, "Standard Specification for Concrete Aggregates"
   2. ASTM D698, "Test Method for Moisture-Density Relationship of Soils"
   3. ASTM D1556, "Test Method for Density of Soil In-Place, Sand-Cone Method"
   4. ASTM D2922, "Test Methods for Density of Soil In-Place by Nuclear Methods"
   5. ASTM D2487, "Classification of Soils for Engineering Purposes" (USCS)
   6. ASTM D2488, "Description and Identification of Soils"
   7. ASTM D4632, "Standard Test Method for Grab Breaking Load and Elongation of Geotextiles"
   8. ASTM D4751, "Test Method for Determining Apparent Opening Size of a Geotextile"
   9. ASTM D4873 "Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls"
   10. ASTM D 6637 "Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method"

B. Occupational Health and Safety Administration (OSHA) Health and Safety Standards for Excavation, 29 CFR Part 1926, or successor regulations.

1.4 SUBMITTALS

A. Submittals must be made in accordance with the requirements of Division 1 and this Section.

B. Provide a gradation analysis and identification of source for all soil materials imported from off site. List all intended uses for each gradation.

C. Provide manufacturer's information for all geosynthetic, insulation, sub-drain pipe and pond liner materials.

1.5 RELATED WORK

A. Related Sections:
   1. Section 012200 – Unit Prices
   2. Section 312500 – Storm Water Pollution Prevention
   3. Section 320190 – Tree Preservation and Protection
   4. Section 321216 – Asphalt Paving

1.6 TERMS

A. Primary Support Material: Soil material placed beneath but not greater than 3-feet below finish grade at pavement areas or finished floor elevation.

B. Secondary Support Material: Soil material placed more than 3-feet below finish grade at pavement areas or finished floor elevation.

C. General Topsoil: General topsoil placed for sod or seed areas.

D. Planting soil: Soils placed to promote growth of trees, shrubs and other vegetation.

E. General Fill: All fill not otherwise defined.

F. Sub-Base Material: A specific gradation of larger crushed stone used to improve subgrade, and provide a support layer for base material.

G. Base Material: A specific gradation of crushed stone that exhibits support characteristics, but has fewer voids then the sub-base material.

H. Best Management Practices (BMPs): Practices, techniques, and measures that prevent or reduce water pollution from non-point sources by using the most effective and practicable means of achieving water quality goals. Best management practices include, but are not limited to, official controls, structural and nonstructural controls, operations and maintenance procedures.

I. Rock Construction Exit: A stabilized rock area at the site exit for the purpose of cleaning truck tires.

J. Silt Sump: A temporary excavation intended to detain storm water discharge to collect silt.

1.7 UNIT PRICES

A. All of the work and conditions shown in the documents are to be included in the base bid. The unit prices noted below will apply only to a change in the scope of work. Unit prices do not apply without A/E review and Owner approval prior to beginning the work.

B. Testing Agency representative will determine suitability of sub-grade, establish location and extent of additional earthwork if needed, and determine the volume or area for payment based on unit prices. If necessary, the Owner will pay for a survey that determines the volume or area of additional earthwork items to be based on unit prices. The Contractor must provide drawings from a licensed surveyor for any dispute of the volume or area determined for unit price payment.

C. Unit Price Descriptions
   1. Remove Unsuitable Material (off-site disposal): Provide a price per cubic yard (in place) for removal of unsuitable material and properly disposing of the material off-site.

   2. Select Granular Material (borrow): Provide a price per cubic yard (in place) for importing and placing Select Granular Material in accordance with the specified requirements for Primary Fill to replace Unsuitable Material.

   3. Stabilization Geotextile: Provide a unit price per square yard (installed) to furnish and place a stabilization geotextile on sub-grade.

   4. Stabilization Aggregate: Provide a price per cubic yard (in place) for importing and placing Stabilization Aggregate in accordance with the specified requirements for Primary Fill.

5. Boulders: Base bid includes removing from the site boulders up to 1 cubic yard. Provide a unit price per cubic yard for removing boulders larger than 1 cubic yard and properly disposing off-site.

6. Aggregate Base Material: Provide a price per cubic yard (in place) for importing and placing Aggregate Base Material in accordance with the specified requirements in Section 321216 - Asphalt Paving.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Topsoil: The on-site topsoil is assumed to meet the following requirements:
   1. Topsoil borrow must be fertile, friable, natural loam containing 3.3 to 15.0 percent organic matter and be capable of sustaining vigorous plant growth. It must be taken from a well drained arable site and be free of any admixture of subsoil, stones, lumps, clods of hard earth, plants, or their roots, sticks, and other extraneous matter. Topsoil must not be used for planting operations while in a frozen or muddy condition.
   2. Testing of the topsoil is by related specification Section 329200 -Turf Grass and Section 329000-Planting.

B. Size Restrictions: The following fill types must not contain stones or fragmentary rock measured in their greatest dimension larger than the following sizes:

1.	Topsoil	1-1/2-inch
2.	Structural fill	3-inch
3.	Primary Support Material	3-inch
4.	Secondary Support Material	4-inch
5.	General fill	6-inch

C. Unsuitable Material: All saturated and unsaturated mixtures of soil containing organic and/or inorganic matter, such as humus, spongy matter, roots, stumps, muck, peat, fatty clay, rubbish and other objectionable materials as designated by the TA.

D. Suitable Material: All mineral soil except topsoil, rock and unsuitable material as defined above is termed suitable.

E. Select Suitable Material: Non-expansive mineral soil free of significant rock quantities and having a plasticity index of 15 (or less), and a liquid limit of 35 (or less). Soil must be free of any materials that may prevent attaining specified density.

F. Granular Material: Clean granular soil material meeting the following requirements.
   1. Minimum 90% passing the 1½” sieve.
   2. 12% Maximum passing the #200 sieve.
   3. If the material is to also provide a working surface, the material must not contain more than 45% on two consecutive normal sieve increments, i.e., #200, #100, #60, #40, #30, #20 and #10.

G. Select Granular Material: Clean granular soil material meeting the following requirements.
   1. Minimum 100% passing the 1” sieve.
   2. Minimum 90% passing the ½” sieve.
   3. Minimum 70% passing the #10 sieve.
   4. 40% Maximum passing the #40 sieve.
   5. 5% Maximum passing the #200 sieve.
   6. Soils meeting ASTM D 2487 categories SP, SW, GP or GW may qualify.

H. Stabilization Aggregate: Must be 100% crushed quarry rock per ASTM C-33 with a gradation in accordance with size No.4 (1-1/2-inch to 3/4-inch sieves).

I. Aggregate Base Material: Conform to Mn/DOT, Section 3138, Class 5, 100 percent crushed rock.

2.2 GEOSYNTHETICS

A. Geotextile Filter: Tencate - Mirafi 140N, Propex - Geotex 104F, US Fabrics, Inc. – US 270F or US 670, or approved equal. Other manufacturers may be submitted, provided, all the information needed to indicate the geotextile has equal or better characteristics is included in the submittal.

B. Geotextile Stabilization: Tencate - Mirafi 500X, Propex - Geotex 801, US Fabrics, Inc. – WE 250 or WE 315, or approved equal. Other manufacturers may be submitted, provided, all the information needed to indicate the geotextile has equal or better characteristics is included in the submittal.

C. Heavy Duty & Machine Sliced Silt Fence Geotextile: Mirafi FF101, Propex 2134, and US Fabrics, Inc. – US1540, or approved equal. Other manufacturers may be submitted, provided, all the information needed to indicate the geotextile has equal or better characteristics is included in the submittal.

2.3 MISCELLANEOUS MATERIALS

A. Rock Construction Exit: Provide rock meeting ASTM C33 for size No.1 gradation rock (3-1/2-inch to 1-1/2-inch sieves).

PART 3 EXECUTION

3.1 PREPARATION

A. Examine site areas and conditions within the contract limits. Notify A/E in writing, of all conditions detrimental to proper and timely completion of Work.

B. Obtain all permits and approvals required to perform the work, except as noted herein. Examine site areas and conditions within the contract limits. Notify A/E in writing, of all conditions detrimental to proper and timely completion of Work.

C. Proceed with Work only after unsatisfactory conditions have been remedied. Start of work indicates acceptance of existing conditions and responsibility for proper execution and completion of work as specified herein.

D. Locate existing utilities:
   1. Use the Gopher State One Call System at 1-800-252-1166, 48-hours prior to performing any excavation.
   2. Field verify location and elevation of existing utility lines that may be disturbed by excavation operations. Excavate, as necessary, to determine exact utility locations.
   3. Review project with all applicable utility operators.
   4. When required, coordinate removing, relocating, or disconnecting and capping of utility lines.
   5. If utilities are to remain in place, provide appropriate means of protection during earthwork operations.
   6. The Contractor must pay all costs charged by utility companies for repairing utility lines damaged by earthwork operations.

3.2 PRECAUTIONS

A. Buildings and Structures: Exercise extreme care near building or retaining walls. Provide the necessary bracing, shoring, sheet piling, slopes and/or other protection as required to maintain grades outside the area of excavation for the protection of existing adjacent facilities (service lines, utilities, streets, drives, walks, etc.), that may be subject to damage during the earthwork operations. Do not operate heavy equipment close to building walls without adequate support of foundations and walls.

B. Underground Features: Drawings indicate approximate locations of known underground utility and service lines. All utilities may not be shown. Exercise extreme care in excavating to prevent damage to existing underground features. Excavation near existing utilities and foundations must be done by hand.

C. Water: Prevent water from ponding in any building or pavement area by carefully scheduling excavation and fill procedures, maintaining grading, and providing diversion ditches, sumps and pumps to the convey water to an approved discharge point. It may be necessary to dewater the excavation for proper preparation of the soil under the proposed building. If necessary, the Contractor is responsible for the design of the dewatering system and should review the dewatering system design with the TA.

D. Soil Movement: Review construction procedures with TA and incorporate appropriate adjustments as necessary to protect integrity of soils that will remain inplace. Frost susceptible soil types that may cause heaving or settlement due to frost action must be removed from the designated frost protection zone, see the Terms article of this section.

E. Sensitive Soils: Site subgrade soils may be sensitive to disturbance and potential loss of strength under construction traffic and/or excessive moisture. Work in sensitive soil areas with appropriate equipment, such as tracked excavators. Disturbance of these soils in areas of buildings or pavements must be avoided. Water must not be allowed to pond on these soils. If the subgrade becomes unsuitable as a result of the Contractor's operations, as determined by the TA geotechnical engineer, the Contractor is responsible for the cost of the necessary corrective action.

F. All excavation must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, "Excavations and Trenches."

3.3 EROSION CONTROL

A. A Minnesota Pollution Control Agency General Storm-water Permit for Construction Activity (MN R100001) is required for this site. See Section 312500 Storm-Water Pollution Prevention.

   1. The Contractor is responsible for adopting (or developing), implementing, managing, and inspecting the required plans before, during, and following construction consistent with the conditions of the permit. The Contractor is responsible for ensuring that the Best Management Practices (BMPs) are implemented and stay in effect until the construction is complete, the entire site has undergone final stabilization, and a Notice of Termination has been submitted to the MPCA.

B. Erosion Control: The Contractor is solely responsible for complying with the temporary erosion and sediment control requirements of the governing agencies. Best Management Practices must be used to prevent soil from leaving the site and protect excavated areas from eroding. Earthwork operations must not begin until the Contractor has installed temporary erosion control measures as necessary to protect adjacent streets, property, and all storm sewer inlets from sediment transported by storm water runoff.

C. Prevent soil from leaving the site via storm runoff, vehicular tires, or other means. Use silt fencing as needed and construct an exit drive to clean tires of vehicular traffic leaving the site.

D. Restore eroded topsoil areas subsequent to final vegetative cover being established. Repair ruts and re-establish vegetative cover, with no additional compensation provided. Limit repair work to the smallest earthwork equipment practical.

E. Water from rock construction exit or other operations containing sediment must be treated by filtration, a settling basin or other means sufficient to reduce sediment content.

F. Pollutants such as fuels, lubricants, bitumens, raw wash water or waste from construction operations and other harmful materials must be properly disposed of off-site in a permitted disposal facility in accordance with governing regulations.

G. Silt fences must be installed perpendicular to site slopes before any disturbance begins.

H. Provide protection at all inlets receiving storm runoff from exposed earth areas.

I. Topsoil stockpiles must be isolated by placing a perimeter silt fence.

J. Maintenance: All temporary erosion and sediment control measures must be properly maintained and inspected after each storm event. Immediately restore, cleanout, repair and replace the facilities affected by the storm runoff; this includes but is not limited to the following:

   1. Regrade topsoil; reseed and mulch washed out areas.
   2. Restore silt fences to upright, position, clean damaged area, and provide a straw bale backup.

3. Remove sediment from silt fence.
4. Remove sediment from inlet protection.

3.4 CLEARING, STRIPPING AND TREE PROTECTION

A. Clear Site: Remove completely all trees, shrubs, curbs, sidewalks, pavements, walls and other items or obstructions within the contract limits or as specifically designated for demolition. Properly dispose of all demolition material off-site in a permitted disposal facility.

B. Strip Topsoil: Completely strip and stockpile all topsoil within the building area, pavement area, and all areas to be filled. Also strip topsoil from turf or planting areas where excavation will leave less than the minimum thickness of topsoil and planting soil is required. Stockpile topsoil as designated on drawings, or if not designated, as required by General contractor or Owner's representative. Dispose of unacceptable or excess topsoil off-site only after all topsoil and planting soil requirements have been satisfied.

C. Tree Protection: Reference related specification Section 320190-Tree Preservation and Protection.

D. Tree Protection: Protect all trees outside of the contract limits and specifically designated on the drawings by the following methods:
   1. For trees inside the contract limits or within 10-feet of silt fence at grading limits, place 4-foot high orange construction fencing around the tree at the drip line.
   2. Shore or sheet as necessary to protect trees near excavation.
   3. Branch or root cutting, if required, must be done with sharp tools, and cuts over ½-inch must be painted with approved tree paint having an asphalt base.
   4. Protect root zone within 10-feet of tree trunk as follows:
      a. Prevent vehicular traffic/parking or storage of supplies.
      b. Prevent dumping of refuse or chemically injurious materials or liquids.
      c. Prevent puddling or continuous running water.

3.5 EXCAVATION

A. General Excavation (applies to all excavation):
   1. All excavations must conform to the lines, grades, and elevations depicted on the drawings or designated in the specifications to provide proper allowance for structures, base material, surfacing, topsoil and other construction items.
   2. The best excavated materials must be used to the extent feasible to complete the earthwork.
   3. Strip all existing topsoil from areas where fill will be placed, stone surfacing will be placed, pavement, buildings or other structures will be constructed. Existing topsoil depths are indicated in the Report of Geotechnical Exploration and Review.
   4. Remove all unsuitable material encountered in the excavation areas where loading will be superimposed.
   5. Maintain temporary drainage facilities until permanent facilities are completed.
   6. Unit Price application: If additional excavation is directed by the TA geotechnical engineer and authorized by Owner, the additional work is subject to compensation with Unit Prices. The additional work must be recorded as described in article 1.6 Unit Prices and Division 1.
   7. If the excavation or construction disturbs the foundation subgrade, as determined by the TA geotechnical engineer, the disturbed soils must be removed and corrections made as directed by the TA. Correction of soil disturbed by the Contractor's operations is the Contractor's responsibility, and no compensation will be provided.

B. Excavation for pavement areas:
   1. Pavement Sub-grade: In cut areas assume the sub-grade elevation for the pavement section is the bottom of the aggregate base given for the pavement section. In fill areas, the sub-grade elevation for the pavement section is the competent mineral soil exposed after stripping topsoil and unsuitable soils. The TA representative must observe, test and accept all sub-grades to determine competency for support.

3.6 SUBGRADE PREPARATION IN PAVEMENT AREAS

A. Preparation for Pavement: After excavation to subgrade is complete, subgrade soils should be surface compacted with a heavy, 14-ton roller, towed or self-propelled, vibratory steel wheel roller with at least 10 passes of the roller. After subgrade is prepared proofroll the exposed subgrade with a loaded tandem dump truck, 12-ton minimum, while the TA's geotechnical engineer is present. Proofroll during a time of good weather with the subgrade at the proper moisture content. Any areas that deflect (pump) during proofrolling should be over-excavated to firm material and replaced with compacted, select suitable or granular material as directed by TA representative. See also unit price provisions as specified herein.

   1. Where it is impractical to compact with a towed or self-propelled roller, and proof roll with a loaded truck, compact the subgrade with the largest compactor appropriate for the size of the excavation. The TA representative must observe the subgrade reaction to determine the adequacy for support.

3.7 FILL

A. Compaction standard: Unless noted otherwise, all specified soil density refers to ASTM D-698 for densities established by the Standard Proctor Method or ASTM D1557 for densities established by the Modified Proctor Method.

B. General requirements:

   1. When more than one soil type is available on-site, the type or types exhibiting the better structural and drainage characteristics must be used in fill areas where some type of loading will be superimposed.
   2. Place fill in a manner to prevent stones nesting and forming voids.
   3. Obtain the moisture content within 3% of optimum, as determined by the TA, by either aerating wet material if weather conditions permit, or by spraying or sprinkling with water if it is too dry. Each lift must be mixed thoroughly, if drying or wetting is required, to insure uniform distribution of the moisture.
   4. Frozen fill material must not be placed, spread or rolled in the embankment. Fill material must not be placed on frozen ground or during unfavorable weather.
   5. When the work is interrupted by unfavorable weather conditions, fill operations must not be resumed until the TA indicates that the moisture content and density of the previously placed fill are as specified.
   6. A lift denotes the maximum thickness of loose material that may be placed prior to compaction. Unless noted otherwise all values given below assume that the largest self-propelled equipment of the proper type and size is used. The lift thickness may be increased or decreased by direction of the TA geotechnical engineer, if the equipment, conditions, and results of the density tests warrant the change.
   7. All backfill immediately adjacent to structures must be compacted with equipment that will not damage the structure. This includes, but is not limited to, foundations, utility structures, building walls, curbs, pole foundation and others, etc.
   8. Compaction with all non self-propelled compaction equipment is limited to maximum lifts of 6-inches.
   9. If soil analysis or compaction tests indicate that the materials specified have not been furnished, placed or compacted in compliance with these specifications, the material must be removed, replaced, recompacted and retested.
   10. On existing slopes that exceed a 4:1 slope, reshape the sub-grade to form benches prior to placing the fill.

C. General Fill:

   1. General fill applies to all fill not otherwise defined. This is generally lawn or planting areas.
   2. Materials allowed are all materials listed in Part 2 of this specification, except Unsuitable Material.
   3. Maximum lift thickness for cohesive material is 12-inches. Maximum lift thickness for Granular Material is 24-inches.
   4. Compaction: Minimum percentage 90% Proctor.

D. Primary Support Material:
   1. Allowable materials are Granular Material, or Select Granular Material.
   2. Maximum lift thickness for granular material is 15-inches.
   3. Compaction: Minimum percentage 100% Proctor.

E. Secondary Support Material:
   1. Allowable materials are Select Suitable Material, Granular Material, or Select Granular Material.
   2. Maximum lift thickness for cohesive material is 8-inches. Maximum lift thickness for granular material is 15-inches.
   3. Compaction: Minimum percentage 95% Proctor.

3.8 GRADING

A. Rough Grading:
   1. Cut, fill and grade to transform site to elevations and contours shown on site plan with allowances made for granular cushions, topsoil clay underlayment, topsoil, and pavements. Grading tolerance, unless noted differently on the grading plan, must be as noted above.
   2. Remove all debris, building materials, large stones, boulders, branches or other obstructions. Hand level around permanent obstructions.
   3. Ease new grades into existing grades without awkward or abrupt transitions.
   4. Rough grade must be within 2-inches of final grade before finish grading begins.

B. Finish Grading:
   1. Blade, drag, and rake to uniform slopes, achieving a uniform surface. All sticks, branches, roots, rocks, and other debris on the surface must be picked up and removed from the site.
   2. Unless specifically noted on the drawings, contact the A/E office if any of the following general grading criteria is not being obtained:
      a. Sidewalk cross-slopes 2.0% (+/-0.5%).
      b. Maximum finished grade for planted slopes 3:1 horizontal/vertical.
      c. Stoops and walks outside of doors to be flush with the floor and sloping away from the building with slopes 2.0% (+/-0.5%) for the first five feet.

3.9 TOPSOIL

A. Turf Areas: Import topsoil to ensure that a minimum depth of 6-inches and a maximum depth 12-inches is obtained.

B. Fertilizers and mulch are by related specification sections.

C. Uniformly distribute topsoil. Lightly hand roll to eliminate soft spots. Do not over compact topsoil (maximum 90% proctor).The properly prepared surface should allow seeding and/or sodding to proceed with minimum additional soil preparation and tillage. Additional requirements follow:
   1. Remove stones, clods, and debris over 1-1/2-inches in size.
   2. Place approximately 1/2 of the total amount of topsoil required. Work into the top of the loosened sub-grade to create a transition layer and then place the remainder of the topsoil.
   3. Allow for sod thickness.
   4. Make sure the topsoil behind curbs has been lightly compacted so that the grass will be flush with the top of curb. This is a common problem area.

D. Following a rain event, look for water pockets that may indicate improper drainage. Correct all drainage problems and notify the A/E office prior to scheduling work by related specification sections for the vegetation. A periodic site visit by the A/E office is recommended before seed or sod is placed.

3.10 EARTHWORK TOLERANCE

A. Grade and Alignment Tolerances:
   1. The final grade must conform to Drawings within the following tolerances:

1.8 GRADE TYPE	HORIZONTAL MEASURE (feet)	VERTICAL MEASURE (feet)
Cut and Fill Slopes (General Grading)	1.0	0.10
Cut and Fill Areas in Roadbeds	0.2	0.05
Cut and Fill Areas in Aprons, Yards, etc.	0.2	0.05

1. Where appropriate, the above tolerances, with the A/E's approval, can be exceeded if drainage is maintained and the grade is relatively uniform. In all cases, the areas must drain as intended.
2. Grade staking: Upon request of the A/E office the Contractor must provide grade stakes to demonstrate plan conformance. This will typically be requested when grading does not appear to conform to the plan or ponding is occurring.

3.1 TESTING AGENCY REQUIREMENTS

A. An independent testing agency (TA) must conduct all the laboratory tests, field tests and observations of soils. The TA requirements include but are not limited to the following:
   1. Reference Division 1 for payment and other responsibilities regarding the TA.
   2. Analyze all fill soils, including topsoil, for compliance with these specifications.
   3. Be present on site when structural fill, primary fill,, building fill or backfill is being accomplished.
   4. Provide periodic compaction tests on all fills at the frequencies noted below.
   5. Provide report on their observations of sub-grade reaction during proof rolling and compaction for foundations, floors and pavement sub-grades. Sub-grade reactions within the building area shall be recorded in a separate building area subgrade written report using grid references. Pavement area subgrades unless noted otherwise may be covered in general observation reports. Verify and record that all the sub-grades within the building and pavement areas will provide the sub-grade requirements given on the structural drawings and soil report.
   6. Notify and provide recommendations to A/E, if unstable areas are encountered, direct subgrade corrections.
   7. Perform field density test in accordance with ASTM D1556-64 (Sand Cone Method) or ASTM D2922 (Nuclear Method). On any given project, nuclear method must be limited to 90% of total test number, with location mixed such that correlation with sand cone method can be easily made.
   8. Documenting the cut and fill slopes related to fill procedures in the building.
   9. Documenting groundwater elevations in the excavations within or near the building.

B. Test Frequency:
   1. Provide one mechanical analysis or Atterberg limit test (dependent on whether soil is cohesionless or cohesive) for each class of fill soil specified or fills soil from a given source.
   2. Establish density and moisture content for each class of fill per ASTM D-698 for densities established by the Standard Proctor Standard or ASTM D1557 for densities established by the Modified Proctor Standard.
   3. The number of field density tests required must be per the following:
      a. One test for each 50 cu.yds. of fill beneath building footings or fill used for subgrade correction, i.e. subcut fill, with at least one test for every 2 -feet (vertical) of backfill and fill.
      b. One test for each 100 cu.yds. of fill within a building area or backfill at building perimeter, with at least one test for every 2 -feet (vertical) of backfill and fill.
      c. One test for each 500 sq.yds. of prepared subgrade at proposed paved areas.
      d. For each isolated volume of less than 50 cu.yds., 100 cu.yds., or 500 sq.yds., respectively, perform at least one test.

3.2 CLEAN-UP AND DISPOSAL

A. Clean-up: Thoroughly police and rake the site and adjacent areas as required to provide neat clean surfaces. Areas outside the contract limits that have been disturbed during construction must be restored to original or better condition.

B. Disposal: Legally dispose of excess soils, trash, debris and other waste material off-site in a permitted disposal facility.

3.3 EARTHWORK VOLUME ADJUSTMENT

A. Balance: The earthwork volumes are not intended to balance on-site, therefore off-site areas must be used for borrow and/or disposal.

END OF SECTION

SECTION 312500
STORM WATER POLLUTION PREVENTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Providing and maintaining storm-water pollution prevention measures and subsequent removal.
   2. Temporary Surface Restoration, if required.

1.2 QUALITY ASSURANCE

A. Utilize equipment of proper size and in good working condition to prosecute the work to full completion in a satisfactory manner.

B. Utilize qualified personnel familiar with the equipment, methods and procedures for storm-water pollution control.

1.3 REFERENCES

A. Minnesota Pollution Control Agency (MPCA)
   1. http://www.pca.state.mn.us/water/stormwater/stormwater-c.html

B. MPCA - Protecting Water Quality in Urban Areas - A Manual, March 1, 2000

C. Minnesota Department of Transportation (Mn/DOT) Standard Specifications for Construction, Latest Edition

D. Minnesota Statutes Chapters 115 and 116. Minnesota Rules Chapters 7000, 7001, 7050, and 7060

E. http://www.mnerosion.org/

1.4 TERMS

A. Geotextile Filter Fabric: A geosynthetic fabric used for separating soil materials.

B. Geotextile Reinforcement: A geosynthetic fabric used for stabilizing subgrade.

C. Geogrid: A geosynthetic open mesh grid used for stabilizing subgrade.

D. Rock Construction Exit: A stabilized rock area at the site exit for the purpose of cleaning truck tires.

E. Vehicle Cleaning Area: An area near the site construction exit designated for cleaning truck tires and vehicles. This area may be on pavement in which the water runoff is directed to a silt sump.

F. Silt Sump: A temporary excavation intended to detain storm water discharge and collect silt.

G. Best Management Practices (BMPs): Erosion and sediment control and water quality management practices that are the most effective and practicable means of controlling, preventing, and minimizing degradation of surface water, including avoidance of impacts, construction-phasing, minimizing the length of time soil areas are exposed, prohibitions, and other management practices published by state or designated area-wide planning agencies.

H. Construction Activity: A disturbance to the land that results in a change in the topography, existing soil cover (both vegetative and non-vegetative), or the existing soil topography that may result in accelerated storm water runoff, leading to soil erosion and movement of sediment into surface waters or drainage systems. Examples of construction activity may include clearing, grading, filling and excavating. Construction activity includes the disturbance of less than one-acre of total land area that is a part of a larger common plan of development or sale if the larger common plan will ultimately disturb one-acre or more.

I. Final Stabilization: After soil disturbing activities at the site have been completed and a uniform (e.g., evenly distributed, without large bare areas) perennial vegetative cover with a density of 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles).

J. Storm Water Pollution Prevention Plan (SWPPP): A plan for storm water discharge that includes erosion prevention measures and sediment controls that, when implemented, will decrease soil erosion on a parcel of land and decrease off-site non-point pollution. The plan must be a combination of narrative, plan sheets and if appropriate standard detail sheets that address the foreseeable conditions, at any stage in the construction or post construction activities. The plan must include a description of the nature of the construction activity. The plan must address the potential for discharge of sediment and/or other potential pollutants from the site.

K. Surface Water: All streams, lakes, ponds, marshes, wetlands, reservoirs, springs, rivers, drainage systems, waterways, watercourses, and irrigation systems whether natural or artificial, public or private.

1.5 RELATED WORK

A. Related Sections:
   1. Section 310000 – Earthwork
   2. Section 329200 – Turf Grasses

B. Coordination:
   1. Coordinate temporary cover provisions with permanent turf establishment.
   2. Erosion and sediment control measures, temporary seeding, and mulch are required by this section. Close coordination with earthwork operations is required. Maintenance of all erosion control measures and temporarily surfaced areas is required until a Notice of Termination (NOT) is completed and submitted to the MPCA.

PART 2 PRODUCTS

2.1 MATERIALS

A. Stabilization Aggregate: Must be 100% crushed quarry rock per ASTM C-33 with a gradation in accordance with size No.4 (1-1/2-inch to ¾-inch sieves).

B. Silt Fence: MIRAFI Co. "Silt Fence Structure," or approved equal.

C. Rock Construction Exit: Provide crushed rock meeting ASTM C33 for size No.1 (3-1/2-inch to 1-1/2-inch sieves).

D. Silt Sump: Unless otherwise noted temporary structures and piping must be 14 gauge metal conforming to ASTM A796 with either aluminized coating per specification ASTM A819 or galvanized coating per ASTM A444. Perforated sections must have 1/4-inch holes, 6-inches on center both ways unless noted otherwise.

E. Geotextile Filter Fabric: Mirafi Type 140S, Amoco Type 4545, and Synthetic Industries Type 401, or approved equal. Other manufacturers may be submitted, if all the information required to indicate the geotextile has equal or better characteristics is included in the submittal.

F. Geotextile Stabilization: Mirafi Type 500X, Amoco Type 2002, or approved equal. Other manufacturers may be submitted, if all the information required to determine the geotextile has equal or better characteristics is included in the submittal.

G. Fine Filter Aggregate-02300: Commonly known as concrete sand, must meet the criteria of ASTM section C33 for Fine Aggregate.

H. Coarse Filter Aggregate-02300: Must meet requirements of ASTM C33 for a size No.67 (3/4-inch to #4 sieves).

I. Erosion Control Blanket: Wood excelsior mat (Mn/DOT Specification 3885).

J. Temporary Seed:

1. Type: Seed Mixture 260. MnDOT section 3876.2
2. Rate: 100 lbs. per Acre

K. Hydromulch:

1. MnDOT Type 6 Hydraulic Soil stabilizer
2. Rate: 75 lbs. per 1,000 sq. ft

PART 3 EXECUTION

3.1 PREPARATION

A. A Minnesota Pollution Control Agency General Storm-water Permit for Construction Activity (MN R100001) is required for this site. Contractor must coordinate permit application and construction activities controlled by the permit with the Owner.

1. The Contractor is a permittee with the Owner and must ensure compliance with the terms and conditions of the General Storm-water Permit for Construction Activity (MN R100001).
2. The permit establishes conditions for discharging storm water from the site. Except as provided in Subparts 3.b. and 3.c. of the permit, permit coverage will become effective seven days after the postmarked date of the completed application form.
3. Owner's Contact:

   Owner: State of Minnesota
   Contact: Wayne Waslaski, Senior Director
   Real Estate & Construction Services, Department of Administration
   309 Administration Building
   50 Sherburne Avenue; St Paul MN 55155
   651-201-2548
   wayne.waslaski@state.mn.us

4. Submit the Application for General Storm Water Permit for Construction Activity (MN R10001) and required fee to: MPCA
   REM Division, Construction Storm-water Permit Program
   520 Lafayette Road North
   St. Paul, MN 55155-4194
   651-297-2274

B. Examine site areas and conditions within the contract limits. Notify Architect/Engineer (A/E) in writing, of all conditions detrimental to proper and timely completion of Work.

C. Locate existing utilities:

1. Locate existing utility lines that may be disturbed by excavation operations.

D. Do not disturb an area until it is necessary for construction to proceed. Time construction activities to limit impact from seasonal climate changes or weather events.

3.2 STORM WATER POLLUTION CONTROL

A. A Storm-Water Pollution Prevention Plan (SWPPP) has been prepared for this project, and must be referenced before submitting the permit application.

B. The Contractor must identify a person knowledgeable and experienced in the application of erosion prevention and sediment control BMPs who will oversee the implementation of the SWPPP, and the installation, inspection and maintenance of the erosion prevention and sediment control BMPs before and during construction until the NOT is filed.

C. The Contractor is responsible for proper construction and maintenance of all temporary and permanent erosion and sedimentation controls.

D. The Contractor must amend the SWPPP as necessary to include additional requirements, such as additional or modified BMPs, designed to correct problems identified or address situations whenever:

1. There is a change in construction, operation, maintenance, weather or seasonal conditions that has a significant effect on the discharge of pollutants to surface waters or underground waters.
2. Inspections or investigations by site operators, local, state or federal officials indicate the SWPPP is not effective in eliminating or significantly minimizing the discharge of pollutants to surface waters or underground waters or that the discharges are causing water quality standard exceedances.
3. The SWPPP is not achieving the general objectives of controlling pollutants in storm water discharges associated with construction activity, or the SWPPP is not consistent with the terms and conditions of the General Storm Water Permit for Construction Activity (MN R100001).
4. At any time after permit coverage is effective, the MPCA may determine that the project's storm water discharges may cause, have reasonable potential to cause, or contribute to non-attainment of any applicable water quality standard, or that the SWPPP does not incorporate the requirements in Part III.A.7 related to an approved Total Maximum Daily Load (TMDL) implementation plan that contains construction storm water related requirements.
5. If notified by MPCA, the Contractor must develop a supplemental BMP action plan or appropriate SWPPP amendments describing SWPPP modifications to address the identified concerns and submit information requested by MPCA, which may include an individual permit application. If MPCA's written notification requires a response, failure to respond within the specified timeframe constitutes a permit violation.

3.3 EROSION PREVENTION PRACTICES

A. The Contractor must plan for and implement appropriate construction phasing, vegetative buffer strips, horizontal slope grading, and other construction practices that minimize erosion, to comply with the inspection and maintenance requirements of General Storm Water Permit for Construction Activity (MN R100001).

B. The location of areas not to be disturbed must be delineated (e.g. with flags, stakes, signs, silt fence etc.) on the development site before work begins.

C. All exposed soil areas must have temporary erosion protection or permanent cover for the exposed soil areas year-round.

   1. These areas include constructed storm water management pond side slopes, and any exposed soil areas with a positive slope to a storm water conveyance system, such as a curb and gutter system, storm sewer inlet, temporary or permanent drainage ditch or other natural or man-made systems that discharge to a surface water. Temporary stockpiles without significant silt, clay or organic components (e.g., clean aggregate stockpiles, demolition concrete stockpiles, sand stockpiles) and the constructed base components of roads, parking lots and similar surfaces are exempt from this requirement but must comply with General Storm Water Permit for Construction Activity (MN R100001), Part IV.C.5.

D. The normal wetted perimeter of any temporary or permanent drainage ditch that drains water from a construction site, or diverts water around a site, must be stabilized within 200 lineal feet of property edges or the point of discharge to any surface water. Stabilization of the last 200 lineal feet must be completed within 24-hours after connecting to a surface water. Stabilization of the remaining portions of any temporary or permanent ditches or swales must be complete within 14 days after connecting to a surface water and construction in that portion of the ditch has temporarily or permanently ceased.

E. Pipe outlets must be provided with temporary or permanent energy dissipation within 24-hours of connection to a surface water.

3.4 SEDIMENT CONTROL PRACTICES

A. Sediment control practices must minimize sediment entering surface waters, including curb and gutter systems and storm sewer inlets.

   1. Temporary or permanent drainage ditches and sediment basins that are designed as part of a treatment system (e.g., ditches with rock check dams) require sediment control practices only as appropriate for site conditions.
   2. If the down gradient treatment system is overloaded, additional upgradient sediment control practices must be installed to eliminate the overloading, and the SWPPP must be amended to identify these additional practices as required in General Storm Water Permit for Construction Activity (MN R100001), Part III.A.4, a. through c.
   3. In order to maintain sheet flow and minimize rills and/or gullies, there shall be no unbroken slope length of greater than 75-feet for slopes with a grade of 3:1 or steeper.

B. Sediment control practices must be established on all down gradient perimeters before any upgradient land disturbing activities begin. These practices shall remain in place until final stabilization has been established in accordance with General Storm Water Permit for Construction Activity (MN R100001), Part IV.G.

C. The timing of the installation of sediment control practices may be adjusted to accommodate short-term activities such as clearing or grubbing, or passage of vehicles. Any short-term activity must be completed as quickly as possible and the sediment control practices must be installed immediately after the activity is completed. However, sediment control practices must be installed before the next precipitation event even if the activity is not complete.

D. All storm drain inlets must be protected by appropriate BMPs during construction until all sources with potential for discharging to the inlet have been stabilized.

E. Temporary soil stockpiles must have silt fence or other effective sediment controls, and cannot be placed in surface waters, including storm water conveyances such as curb and gutter systems, or conduits and ditches.

F. Vehicle tracking of sediment from the construction site must be minimized by BMPs such as stone pads, concrete or steel wash racks, or equivalent systems. Street sweeping must be used if such BMPs are not adequate to prevent sediment from being tracked onto the street.

G. Control dust by applying water as often as required by soil and weather conditions. Apply water with self-propelled distributor of the pressure type mounted on pneumatic-tired wheels, or other approved method.

3.5 DEWATERING AND BASIN DRAINING

A. Dewatering or basin draining (e.g., pumped discharges, trench/ditch cuts for drainage) related to the construction activity that may have turbid or sediment laden discharge water must be discharged to a temporary or permanent sedimentation basin on the project site. If the water cannot be discharged to a sedimentation basin prior to entering the surface water, it must be treated with the appropriate BMPs, such that the discharge does not adversely affect the receiving water or downstream landowners. The Contractor must ensure that discharge points are adequately protected from erosion and scour. The discharge must be dispersed over natural rock riprap, sand bags, plastic sheeting or other accepted energy dissipation measures. Adequate sedimentation control measures are required for discharge water that contains suspended solids.

B. All water from dewatering or basin draining activities must be discharged in a manner that does not cause nuisance conditions, erosion in receiving channels or on down slope properties, or inundation in wetlands causing significant adverse impact to the wetland.

3.6 INSPECTIONS AND MAINTENANCE

A. The Contractor must routinely inspect the construction site once every seven days during active construction and within 24-hours after a rainfall event greater than ½-inch in 24-hours.

B. All inspections and maintenance conducted during construction must be recorded in writing and these records must be retained with the SWPPP in accordance with Part III.D. Records of each inspection and maintenance activity shall include:

1. Date and time of inspections.
2. Name of person(s) conducting inspections.
3. Findings of inspections, including recommendations for corrective actions.
4. Corrective actions taken (including dates, times, and party completing maintenance activities).
5. Date and amount of all rainfall events greater than ½-inch in 24-hours.
6. Documentation of changes made to the SWPPP as required in General Storm-water Permit for Construction Activity (MN R100001), Part III.A.4.

C. Where parts of the construction site have undergone final stabilization, but work remains on other parts of the site, inspections of the stabilized areas may be reduced to once per month. Where work has been suspended due to frozen ground conditions, the required inspections and maintenance must take place as soon as runoff occurs at the site or prior to resuming construction, whichever comes first.

D. All erosion prevention and sediment control BMPs must be inspected to ensure integrity and effectiveness. All nonfunctional BMPs must be repaired, replaced, or supplemented with functional BMPs. The Contractor must investigate and comply with the following inspection and maintenance requirements:

1. All silt fences must be repaired, replaced, or supplemented when they become nonfunctional or the sediment reaches 1/3 of the height of the fence. These repairs must be made within 24-hours of discovery, or as soon as field conditions allow access.
2. Temporary and permanent sedimentation basins must be drained and the sediment removed when the depth of sediment collected in the basin reaches 1/2 the storage volume. Drainage and removal must be completed within 72-hours of discovery, or as soon as field conditions allow access (see Part IV.D.).

3. Surface waters, including drainage ditches and conveyance systems, must be inspected for evidence of sediment being deposited by erosion. The Contractor must remove all deltas and sediment deposited in surface waters, including drainage ways, catch basins, and other drainage systems, then re-stabilize the areas where sediment removal results in exposed soil. The removal and stabilization must take place within seven days of discovery unless precluded by legal, regulatory, or physical access constraints. The Contractor is responsible for contacting all local, regional, state and federal authorities and receiving any applicable permits, prior to conducting any work.

E. Construction site vehicle exit locations must be inspected for evidence of off-site sediment tracking onto paved surfaces. Tracked sediment must be removed from all off-site paved surfaces, within 24-hours of discovery.

F. The Contractor is responsible for the operation and maintenance of temporary and permanent water quality management BMPs, as well as all erosion prevention and sediment control BMPs, for the duration of the construction work at the site, the site has undergone final stabilization, and a NOT has been submitted to the MPCA.

G. If sediment escapes the construction site, off-site accumulations of sediment must be removed in a manner and at a frequency sufficient to minimize off-site impacts (e.g., fugitive sediment in streets could be washed into storm sewers by the next rain and/or pose a safety hazard to users of public streets).

H. All infiltration areas must be inspected to ensure that no sediment from ongoing construction activities is reaching the infiltration area and these areas are protected from compaction due to construction equipment driving across the infiltration area.

3.7 WASTE MATERIAL MANAGEMENT MEASURES

A. The Contractor must implement the following pollution prevention management measures on the site:

1. Solid Waste: Collected sediment, asphalt and concrete millings, floating debris, paper, plastic, fabric, construction and demolition debris and other wastes must be disposed of properly and must comply with MPCA disposal requirements.
2. Hazardous Materials: Oil, gasoline, paint and any hazardous substances must be properly stored, including secondary containment, to prevent spills, leaks or other discharge. Restricted access to storage areas must be provided to prevent vandalism. Storage and disposal of hazardous waste must be in compliance with MPCA regulations.
3. External washing of trucks and other construction vehicles must be limited to a defined area of the site. Runoff must be contained and waste properly disposed of. No engine degreasing is allowed on site.
4. Concrete washout onsite: All liquid and solid wastes generated by concrete washout operations must be contained in a leak-proof containment facility or impermeable liner. A compacted clay liner that does not allow washout liquids to enter ground water is considered an impermeable liner. The liquid and solid wastes must not contact the ground, and there must not be runoff from the concrete washout operations or areas. Liquid and solid wastes must be disposed of properly and in compliance with MPCA regulations. A sign must be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.

3.8 FINAL STABILIZATION

A. The Contractor must ensure final stabilization of the site. The Contractor must submit a NOT within 30-days after final stabilization is complete, or another owner/operator has assumed control according to General Storm Water Permit for Construction Activity (MN R100001), Part II.B.5 over all areas of the site that have not undergone final stabilization. Final stabilization can be achieved in one of the following ways:

1. All soil disturbing activities at the site have been completed and all soils must be stabilized by a uniform perennial vegetative cover with a density of 70% over the entire pervious surface area, or other equivalent means necessary to prevent soil failure under erosive conditions and;
   a. All drainage ditches, constructed to drain water from the site after construction is complete, must be stabilized to preclude erosion;

b. All temporary synthetic, and structural erosion prevention and sediment control BMPs (such as silt fence) must be removed as part of the site final stabilization; and
c. The Contractor must clean out all sediment from conveyances and from temporary sedimentation basins that are to be used as permanent water quality management basins. Sediment must be stabilized to prevent it from being washed back into the basin, conveyances or drainage ways discharging off-site or to surface waters. The cleanout of permanent basins must be sufficient to return the basin to design capacity.

B. If permanent stabilization cannot occur with 21-days of completing grading activity, establish temporary vegetative cover within 14-days of completing site grading:
   1. Temporary seed and mulch must be certified weed free.
   2. Seed Installation: Install seed with a drop seeder that will accurately meter the types of seed to be planted. Keep all seeds uniformly mixed during the seeding and contain drop seed tubes for seed placement (Brillion-type). The drop seeder should be equipped with a cultipacker assembly to ensure seed-to-soil contact.
   3. Hydromulch: After seeding, hydromulch the entire seeded area.

3.9 CLEAN-UP AND DISPOSAL

A. Clean-up: Thoroughly police and rake the site and adjacent areas as required providing neat clean surfaces. Areas outside the contract limits that have been disturbed during construction must be restored to original or better condition.

B. After final stabilization is achieved and the NOT is filed, remove all temporary sediment control measures.

END OF SECTION

SECTION 320190
TREE PRESERVATION AND PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Preservation and protection of selected existing Trees and vegetation to remain.
   2. Removal of all preservation/protection material upon completion of construction activities by others.

1.2 RELATED SECTIONS

A. Related Sections:
   1. Section 024113 – Selective Site Demolition

B. Sustainable Design Intent: Comply with project requirements intended to achieve certification measured and documented according to LEED Green Building Rating System of the U.S. Green Building Council. Refer to Section 018113 - LEED Program Requirements.

1.3 REFERENCES

A. ANSI publications:
   1. ANSI A300 Tree, Shrub and other Woody Plant Maintenance – Part 1 Pruning
   2. ANSI A300 Tree, Shrub and other Woody Plant Maintenance – Part 3 Supplemental Support Systems
   3. ANSI A300 Tree, Shrub and other Woody Plant Maintenance – Part 4 Lightning Protection
   4. ANSI A300 Tree, Shrub and other Woody Plant Maintenance – Part 5 Management of Trees and Shrubs During Site Planning, Site Development and Construction
   5. ANSI A300 1 Tree, Shrub and other Woody Plant Maintenance – Part 6 Transplanting

B. International Society of Arboriculture. www.isa-arbor.com

C. MDA: Minnesota Department of Agriculture. http://www.mda.state.mn.us/plants.aspx

D. University of Minnesota Extension Service publications:
   1. FO-6135 Protecting Trees from Construction Damage, A Homeowners Guide, http://www.extension.umn.edu/distribution/housingandclothing/DK6135.html
   2. Protecting Existing Trees during Construction, http://www.sustland.umn.edu/implement/protecting_trees.html
   3. 443 Tree Protection from Construction Damage, http://www.extension.umn.edu/info-u/environment/BD443.html

1.4 DEFINITIONS

A. Tree: Deciduous or coniferous woody plant material.
   1. Deciduous: A trunk diameter of two inches or larger measured 4.5-feet above grade (dbh). Multi-stemmed trees are considered as one tree.
   2. Coniferous: Height 4-feet or taller above grade.

B. Debris: Material such as trash, rubbish, concrete, bricks, fencing, culverts, windfalls, decaying matter, ash, etc., including materials generated from demolition of existing structures, surface materials, utilities and brush and tree removal.

C. Dripline: The area directly beneath the edges of a tree's canopy where a majority of its roots occur. One common method used to define a tree's protected root zone (PRZ).

D. Protected Root Zone (PRZ): The area in which construction damage should be avoided is called the PRZ. It is defined by its critical root radius which is calculated by measuring the tree's trunk diameter (dbh) 4.5-feet above the ground in inches. For each inch, allow 1-foot to 1.5-feet of critical root radius. For example, if a tree's dbh is ten inches, the critical root radius is 10-feet to 15-feet. Use the following chart for determining the PRZ:
   1. dbh x 1.0 = critical root radius for younger, or disturbance tolerant species
   2. dbh x 1.5 = critical root radius for older, or disturbance sensitive species

1.5 SUBMITTALS

A. Comply with Section 013000, unless otherwise indicated.

B. Samples: Submit sample for approval of the following:
   1. Tree Protective Barrier. One square foot of chain-link mesh.

1.6 QUALITY ASSURANCE

A. Qualifications: Firm with not less than 5-years experiences in installation of systems similar in complexity to those required for this Project, including specific requirements indicated.
   1. Acceptable to or licensed by manufacturer.
   2. Successfully completed not less than 5 comparable scale projects using this system.

B. Regulatory Requirements: Refer to regulations for the municipality where project occurs.

C. Certifications: Perform work of this Section under the direct supervision of an International Society of Arboriculture Certified Arborist registered in the State of Minnesota.

D. Mock-Up Assembly: Construct mock-ups for Architect review and to establish requirements for ratings and interface between materials and systems.
   1. Correct areas, modify method of application/installation, or adjust assembly to comply with specified requirements.
   2. Document final mock-up. Related Submittals shall reflect accepted mock-up.
   3. Mock-up shall consist of the following:
      a. Tree Protective Barrier installed on-site in a temporary location, 10-feet length.

E. Pre-installation Conference: Contractor, Architect, Installer, Owner's Representative, and Representatives of other affected trades shall meet at the project site to review installation procedure, acceptance of procedure, and coordination with other trades.
   1. Schedule meeting at least 1-week before start of installation.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Deliver fencing products in original unopened packaging with legible manufacturer's identification.

B. Storage and Protection: Comply with manufacturer's recommendations.
   1. Protect from damage by the elements and construction procedures.

1.8 PROJECT CONDITIONS

A. Existing Conditions: Review site conditions with Owner and Architect prior to installation of Tree Protective Barrier.

B. Field Measurements: Verify conditions of proposed tree locations.

1.9 SEQUENCING/SCHEDULING

A. Coordinate preservation/protection activities with General Contractor, Owner and Architect.

1.10 SPECIAL WARRANTIES

A. Contractor/installer shall warranty installed system for a period until the end of the construction period. When notified in writing from Owner, they shall promptly and without inconvenience and cost to Owner correct said deficiencies to comply with requirements of the Contract Documents.

1.11 MAINTENANCE

A. Maintenance: Maintain Tree Protective Barrier as installed.

B. Extra Materials for Owner's Stock:

1. Deliver extra materials to Owner's storage location as coordinated with Owner.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Tree Protective Barrier:

1. Standard chain-link, 2-inch mesh, aluminum or galvanized, 6-feet high.
2. Steel posts, galvanized, 6-feet high.
3. Gate, 6-feet high.

B. Acceptable Manufacturers and Product:

1. Standard commercial grade chain link mesh material.

C. Drawings and specifications are based on manufacturer's proprietary literature from Master Halco www.mhfence.com. Other manufacturers shall comply with the minimum levels of material and detailing indicated on the Drawings or specified herein.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper or timely completion.

1. Do not proceed until unsatisfactory conditions have been corrected.

B. Pruning of Existing Trees:

1. Review existing trees for potential conflicts with proposed building and construction activities.
2. Consult with Owner on direction to resolve any existing tree and proposed construction conflicts.

3.2 PREPARATION

A. Protection: Site tree protection is considered a critical and mandatory part of the work.

3.3 PRUNING OF TREES AND SHRUBS

A. Refer to ANSI A300.

B. Prune to remove all dead wood, suckers and broken or badly damaged branches.

C. Prune to maintain natural form and character of plant in a manner appropriate to species, or as per drawings and specifications.

D. Prune to achieve clean and smooth cuts, leaving branch collar with bark intact and uninjured at edges. Prune with sharp, clean tools appropriate for task as per standard horticultural practice.

E. Remove and properly dispose of all pruning debris from site with no additional cost to Owner. Follow all MDA requirements for disposal of diseased vegetation.

1. Verify with Owner if wood to be removed shall be salvaged.

3.4 INSTALLATION OF TREE PROTECTIVE BARRIER

A. Location: Refer to plans for location of Tree Protective Barrier. Locations may be modified on-site to conform to varying field conditions.

B. Comply with manufacturer's recommendations for Tree Protective Barrier. No concrete footings are required for posts. Posts shall be placed manually or by using a compressed air device.

3.5 FIELD QUALITY CONTROL

A. Refer to Section 014000 for responsibilities for arranging, supervising, and payment of Field Quality Control Requirements.

B. Field Inspections by Owner's Representative: To verify that trees are being protected throughout the duration of construction activities on site.

3.6 CLEAN-UP

A. Remove all Tree Protective Barrier and associated equipment after approval from Owner and Architect upon completion of project.

3.7 CONSTRUCTION WASTE MANAGEMENT

A. Comply with requirements of Section 017419 - Construction Waste Management for removal, recycling, and disposal of construction debris and waste.

END OF SECTION

SECTION 321216
ASPHALT PAVING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Inspection and fine grading of subgrade
   2. Material analysis and tests by testing laboratory
   3. Construction of bituminous pavement
   4. Quality Control/Quality Assurance

B. Related Sections:
   1. Section 310000 – Earthwork
   2. Section 321723 – Pavement Markings and Traffic Signs

1.2 QUALITY CONTROL

A. Testing as defined in these specifications shall be performed with the results submitted to the A/E office prior to the pay request for the work performed. Payment for the testing is identified in Division 1 of these specifications.

B. Utilize equipment of proper size and in good working condition to prosecute the work to full completion in a satisfactory manner. Perform work during suitable weather conditions.

C. Utilize experienced personnel familiar with the equipment, methods and procedures for the job.

D. Plant mixed asphalt pavement mixture must be provided from a Mn/DOT certified plant.

1.3 SUBMITTALS

A. Submittals must be made in accordance with the requirements of Division 1 and this Section.

B. Report(s) that summarize all pertinent field observations and determinations of material suitability, construction methods and operations, and detailed test reports for testing as required herein, and other applicable testing as determined during the course of construction and approved by the A/E.

C. Mn/DOT approved Job Mix Formula (JMF) as specified herein.

1.4 REFERENCE STANDARDS AND ABBREVIATIONS

A. “Mn/DOT”: Minnesota Department of Transportation. This specification references Mn/DOT Standard Specifications for Construction, latest edition, as revised by applicable updated or supplemental specifications for Plant Mixed Asphalt Pavement.

B. “ASTM”: American Society for Testing and Materials.

C. “AASHTO”: American Association of State Highway and Transportation Officials.

D. “JMF”: Job mix formula

E. “A/E”: Architect/Engineer is equivalent to “Engineer”

PART 2 MATERIALS

2.1 AGGREGATE BASE MATERIAL

A. Conform to Mn/DOT, Section 3138, Class 5, 100 percent crushed rock

2.2 BITUMINOUS MATERIALS

A. Bituminous Wear Course: Conform to Mn/DOT, Section 2360 for type (SP)(WE)(A)(3)(40)(L) except as amended in “Modifications” below.

1. Provide the Gyratory Mixture Design - Super Pave (SP), Wear (WE), 1/2” minus aggregate (A), 1 to <3mil ESALs (3), 4% air voids (40), using performance grade PG 64-22 (L). Asphalt content of mixture per result of JMF or as noted otherwise.
2. No shingles are allowed in this mix.
3. Recycled Asphalt Pavement (RAP) is allowed per state specifications for milled asphalt as long as the resulting performance grade of the oil specified is maintained.

2.3 THICKNESS OF MATERIALS

A. Required thickness of pavement sections is designated on the drawings.

2.4 MODIFICATIONS

A. Submit a Mn/DOT approved JMF to the A/E for acceptance.

B. Provide and pay for all work required to develop the Mn/DOT approved JMF.

C. Do not place the bituminous courses prior to acceptance of the JMF by the A/E.

D. Material sample submissions are not part of this specification.

PART 3 EXECUTION

3.1 EXAMINATION OF CONDITIONS

A. Review all slopes, elevations, subgrade, and drainage conditions. Notify A/E of significant discrepancies with the plans and specifications before starting work. The start of work constitutes that the Contractor accepts the existing conditions.

B. If subgrade conditions are unsatisfactory, do not proceed with paving until corrections are made.

3.2 CONSTRUCTION OF BASE AND PAVEMENT

A. Sub-grade
   1. Verify sub-grade is in accordance with drawings and specifications and provides positive drainage. Sub-grade preparation is specified in Specification Section 310000.
   2. Remove minor grade irregularities by fine grading before placing base aggregate.

B. Aggregate Base
   1. Provide specified material specified to the minimum thickness noted on the surfacing plans.
   2. Provide one sample of aggregate base material to Testing Agency for mechanical analysis AASHTO T27. Submit report to A/E.
   3. Place the aggregate base in maximum 4-inch lifts, and compact to 100% Standard Proctor density, ASTM D698. Construct aggregate base according to Mn/DOT Specification 2211, including section 2211.3.C and the Quality Compaction Method.
   4. Shape base course to provide positive drainage. The minimum specified thickness apply after proper the sub-grade has been obtained
   5. After aggregate base is prepared, proofroll the exposed aggregate base with a loaded tandem dump truck, 12-ton minimum, while the TA’s geotechnical engineer is present. Proofroll during a time of good weather with the aggregate base at the proper moisture content. Any areas that deflect (pump) during proofrolling should be over-excavated to firm material and replaced with compacted, select suitable or granular material as directed by TA representative. See Specification Section 310000 for unit price provisions.

C. Bituminous Paving
   1. Place the bituminous base and wear course in conformance with Mn/DOT, Section 2360.5 except as amended in the “Modifications” below.
   2. Required Density: Compact bituminous base and wear courses in accordance with the Maximum Density Method in conformance with Mn/DOT, Section 2360.6.
   3. Apply specified tack coat at a rate of 0.03 gal/sq. yd. on all bituminous base and binder courses

4. Bituminous wear course must not be placed until site concrete work, parking lot lighting, irrigation systems, landscaping, sodding, and similar work is complete. Coordinate construction of wear course with other contractors.

3.3 PARKING STALL AND TRAFFIC LANE PAINTING

A. Reference related specification section 321723.

3.4 TESTING

A. A testing laboratory, experienced in testing aggregate and bituminous materials shall perform tests as specified below. Reference Division 1 for testing payment.

B. Aggregate Base
   1. Proofroll the aggregate base as specified herein.
   2. Visually verify that the surface exhibits thorough consolidation. Take one field density test (ASTM D-1556 or ASTM D-2922) for every 2000-square yards of pavement area footprint or a minimum of two tests -- whichever yields more tests. Density must meet that specified above.
   3. Sieve Analysis (ASTM C136) for every 100- tons or a minimum of two tests -- whichever yields more tests.

C. Bituminous Pavement:
   1. Take one field density test by core sample for every 2000-square yards of bituminous mixture surface or a minimum of two cores -- whichever yields more tests. Core locations to be uniformly distributed throughout the paved area as determined by the testing laboratory. Determine thickness and field density of cores in accordance with ASTM D2726 (ASTM D1188, if applicable).
   2. As an option, nuclear gauge testing may substitute for core field densities for less than half of the required core tests. If this option is chosen, the nuclear gauge test locations must alternate with the core locations evenly across the area of paving, and the average of two nuclear gauge readings must be taken at each test location. The two nuclear gauge readings at each test location must be taken parallel with the centerline (or rolling direction) at directions 180 degrees apart. Determine field densities in accordance with ASTM D2950.
   3. Calibrate the nuclear gauge in conformance with Mn/DOT Section 2340.3H, except as amended in the “modifications” below.
   4. For each 2000-tons of bituminous mixture, verify conformance to the JMF for asphalt cement content and gradation of aggregate by bituminous extraction and gradation per ASTM D2172 or supply mixture quality control data for bituminous mixtures, in lieu of extraction testing. If testing is done, perform one test minimally.

3.5 PAYMENT ADJUSTMENTS

A. Low Density
   1. In the event that the field density for the pavement represented by the test is less than the specified minimum, the area representing the substandard pavement must be designated as the median distance between test locations or outside edges of paving. The substandard area must be delineated on a plan sheet by the Contractor and submitted to the A/E for review. For field densities less than the specified minimum, the substandard pavement area will be accepted, but at a reduced price in accordance with the current MnDOT Specification Section 2360.
   2. For field densities more than three (3) percent below the specified minimum, the A/E in consultation with the Testing Agency and Owner will determine what portion of the pavement, if any, may remain in place. The pay percentage for material remaining in place will be 70% or less as determined by the Owner. The Contractor is responsible for all costs for any required pavement removal and replacement of unacceptable paving.
   3. If the Contractor believes that the core density results are not representative of the area where the noncompliant tests were documented, the Contractor may obtain at least two additional cores in the area in question. The cores must be located such that the non-compliant core and new cores are distributed evenly over the area. The average density of all of the tests for the area in question must be used to determine the reduced payment amount as specified above, if still applicable. The Contractor is responsible for all costs of re-testing.

4. If the Contractor believes that the nuclear density results are not representative of the area for which the non-compliant tests were documented, the Contractor may obtain at least two cores per area in question and base density compliance for the area in question on the core results. If this option is used, the cores must be obtained within 24 hours after placement of the bituminous mixture. The Contractor is responsible for all costs of re-testing.

B. Thin Thickness

1. Where the average thickness of all the bituminous cores (base and/or wear course) is ¼-inch less than the minimum design thickness, the owner may elect to not accept the bituminous sections. If accepted, payment will be at a reduced price that is negotiated with the Owner. The design thicknesses designated on the drawings are minimum values. No additional payment will be made for pavement that exceeds the design thickness. If the bituminous thickness is more than ½-inch less than the design thickness, the bituminous section must be replaced. The Contractor is responsible for all costs for any required pavement removal and replacement of unacceptable paving.

3.6 MODIFICATIONS

A. "Engineer" is equivalent to the A/E.

B. Acceptance testing must be as specified herein. Acceptance schedules are not part of this specification.

C. Sampling locations and density determinations will be made by the Testing Agency.

D. Core sampling and density requirements are as specified herein. The Owner reserves the right to take companion cores to verify the reliability of the Contractor's test results and to serve as acceptance tests.

E. Core sampling and testing may be performed without the A/E present.

F. The calibration factor for nuclear gauge testing of bituminous pavement will be made by comparing the mean of three (3) cores with the mean of six (6) nuclear gauge readings.

G. Density penalties will be as specified herein.

H. Thickness requirements and penalties will be as specified herein.

I. Payment on the basis of unit prices is not part of this specification.

END OF SECTION

SECTION 321723
PAVEMENT MARKINGS AND TRAFFIC CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Preparation and provisions for pavement markings including parking stalls, stop bars, and special symbols.
   2. Reserved parking stall and traffic signs

B. Related Sections:
   1. Section 321216 – Asphalt Paving

1.2 REFERENCES

A. Manual on Uniform Traffic Control Devices for Streets and Highways, U.S. Department of Transportation, Federal Highway Administration. Latest edition.

B. FS TT-P-110C - Paint, Traffic, Black (Non-Reflectorized).

C. FS TT-P-1952D - Paint, Traffic, Highway White and Yellow.

D. ASTM C94 - Specifications for Ready-Mixed Concrete.

E. ASTM B209 - Aluminum-Alloy Sheet and Plate.

F. NAAMM - Metal Finishes Manual.

1.3 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 013000.
   1. The number of each type of sign and type of support that will be provided.
   2. Confirm features including size, reflectivity and special features.

B. Manufacturer Certification: Submit certified test results with each batch of paint produced for use under this specification. Tests conducted on each batch shall include; weight per gallon, viscosity, and drying time.

1.4 QUALITY ASSURANCE

A. Installer:
   1. Firm which is experienced in pavement marking required for project, for not less than 3-years, and which is acceptable to paint manufacturer.
   2. Firm which is experienced in installation of traffic signs required for project, for not less than 3-years, and which is acceptable to sign manufacturer.

PART 2 PRODUCTS

2.1 TRAFFIC PAINT AND MARKINGS

A. Latex Paint: Alkyd paint formulated specifically for traffic marking, FS TT-P-115E, Type III. Fast-dry white and yellow acrylic latex traffic marking paints for application on concrete and bituminous pavement.
   1. The paints shall be free of lead, mercury, cadmium, hexavalent chromium or any other toxic heavy metals as defined by the United States Environmental protection Agency.
   2. The finished paint shall be smooth and homogeneous, free of coarse particles, skins or any other foreign materials that are detrimental to its application or appearance.
   3. Paint manufacturers must add sufficient anti-settling agents, stabilizers and other additives to insure proper storage stability.

4. Paint must be screened with a 40-mesh or finer screen to remove any coarse particles, skins or foreign material.
5. Paint must be packaged in lined, new 55-gallon or 5-gallon containers. To prevent formation of "skins", the manufacturer shall use a "float" of ammonia water on the paint surface, or a "floating type" plastic liner on the top of the filled container, or some other means that will effectively prevent skinning.
6. Each container shall be marked with the manufacturer's name, type of paint, batch number, date of manufacture, gross weight and container weight.
7. The exact composition of the paints is left to the discretion of the manufacturer, provided the finished paint meets the requirements of this specification.
8. The prime pigment in the organic yellow paint shall be Colour Index Pigment Yellow Number 65 or Number 75.
9. The color of the dry white paint shall be a pure flat white, free of tint.
10. The color of the yellow paint shall closely match Color Number 33538 of Federal Standard 595 and shall conform to the following CIE Chromaticity limits using illuminant "C":

x	0.470	0.485	0.520	0.480
y	0.440	0.460	0.450	0.420

11. Heavy Metals: The white and organic yellow paints shall be free of lead, mercury, cadmium, hexavalent chromium and other toxic heavy metals as defined by the United States Environmental Protection Agency.
12. Approved Manufacturer's/Products:
    a. Diamond Vogel Paints, Orange City, Iowa: UC-1516 White/UC-3588 Yellow
    b. Ennis Paint, Ennis Texas: 985221-M-1 White/985222 52DY-HD-M-1 Yellow
    c. Sherwin Williams, Cleveland Ohio: TM2152 White/TM2153 Yellow

B. Temporary Markings: Preformed pressure sensitive adhesive tape of required color, width and length.

C. Sandblasting Equipment: Provide equipment as required for cleaning surfaces to be painted, including air compressor, hosed, and nozzles of proper size and capacity. Compressor shall be capable of furnishing not less than 150 cfm of 90-PSI min nozzle air pressure.

2.2 SIGNS

A. Base Material for Sign Panels: Sheet aluminum that conforms to ASTM B 209M, for Alloy 5052-H38, or 6061-T6. Manufacture signs from sheets with the following thickness:
   1. Up to and including 18-inch signs = 0.063 inch thickness
   2. Over 18-inch up to 30-inch signs = 0.080 inch thickness
   3. Over 30-inch signs = 0.10 inch thickness

B. Reflective sheeting must conform to AASHTO M 268 Type I, Class 1 (pressure sensitive). 3M Scotchlite "Engineering Grade", or approved equal, except as noted below.
   1. Except that all "Stop", "Do Not Enter", "Ped Crossing", and "One Way" signs must be AASHTO M 268 Type III, Class 1 (High Intensity).

C. Colors must conform to Color Tolerance Charts available from the Federal Highway Administration and the Department of Transportation

D. Fasteners: All bolts, nuts and washers must comply with the following requirements:
   1. Stainless steel conforming with ASTM A 276, Condition A or B, Type 302, 303, 304, or 316.
   2. All dimensions must conform to ANSI. Threads must be ANSI Coarse Thread Series.

2.3 SIGN SUPPORTS AND FASTENERS

A. Two types of sign supports are used.
   1. Channel Support: Unless noted otherwise provide a Lyle "RIB-BAK", grade SP-80 high carbon billet steel, galvanized U-channel support or approved equal at sign locations not in pavement areas. Rib-Bak channels to be the Galvanized, 2-lbs/foot and of the appropriate length to meet the mounting height requirements given for signs in Part 3 of these specifications.

2. Breakaway Support: Provide 2-inch O.D. diameter 18-gauge steel posts, sleeves, and hardware to create a “breakaway” style post as designated in the drawings at sign locations within pavement areas. Provide Lyle sign mounting brackets model BR-95 or approved equal. Provide a concrete footing with sleeve and hardware as defined in this specification section and as designated on the drawings.

2.4 CONCRETE FOOTING

A. Concrete Footing: Provide minimum 12-inch diameter by 18-inch deep concrete footing poured directly against undisturbed earth. Concrete to have 6% air entrainment with a minimum compressive strength of 3000-psi at 28-days.

PART 3 EXECUTION

3.1 PREPARATION

A. Examine areas and conditions under which pavement marking and site signage are to be installed. Do not proceed with work until satisfactory conditions have been corrected.

B. New Surfaces: Allow to cure for period of not less than 30-days before application of marking materials. Clean surfaces before application of paint. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water or combination of these methods as required.

3.2 LAYOUT

A. Establish control points for marking and provide templates to control paint application by type and color, at required intervals. This section herein requires all surveying related to the work in this section.

3.3 PAVEMENT MARKINGS

A. Painting: Apply pavement markings with approved mechanical equipment (with provisions for constant agitation of paint), traveling at controlled speeds with 1 or more paint "guns" synchronized to begin and cut off paint flow automatically in case of skip lines. Provide manual control in case of continuous lines of varying lengths, and to widths shown.

B. Provide pneumatic spray guns for hand application of paint in areas where mobile paint applicator cannot be used.

C. Apply pavement markings in accordance with reviewed shop drawings and paint manufacturer's printed instructions to uniform, true, and sharp line. Apply paint on properly cured, prepared and dried surfaces as indicated to established control points.

D. Painting: Apply paint at wet film thickness of 0.015-inch (15 mils). Apply paint in 1 coat. Light spots shall receive additional coats. Strictly adhere to maximum drying time requirements. Remove and replace paint markings applied at less than minimum material rates, lines deviating from true alignment, exceeding stipulated length and width tolerances or showing light spots, smears, or other deficiencies or irregularities. Provide 300 lin. ft./gallon minimum (4-inch wide strip). Provide paint in minimum 5-gallon containers. Each batch of paint shall be accompanied by certificate stating compliance with applicable publication.

E. Apply markings only in seasonable weather during daylight hours when air and surface temperatures are at least 50 degrees and less than 95 degrees F. Do not perform filling of paint tanks, pouring of paint or cleaning of equipment on unprotected pavement.

F. Parking Stall and Traffic Lane Painting: Tolerances: Length and width of lines within 3-inches and 1/8-inch respectively. In case of skip markings, length of intervals shall not exceed line length tolerance.

G. Cross Hatch: Paint 4-inch wide lines 30-inch on center in a diagonal pattern at a 45-degree angle unless designated otherwise on the drawings. Paint the edges of the hatched area.

H. Stop Bar: Paint a 24-inch wide line in alignment with the stop sign across the lane(s) intended to stop.

I. Temporary Pavement Markings: When indicated, provide tape markings of color, width and length indicated on the plans or submitted by shop drawings. Base bid to include replacing unsatisfactory tape markings that move and removal of the temporary painted or tape markings by carefully scrapping, sand-blasting, grinding or other method that results in a undamaged surface.

3.4 PROTECTION FOR PAVEMENT MARKING

A. Protect painted areas in such manner that necessary traffic can move with- out undue hindrance. Install warning signs at beginning of wet line, and at points well in advance of marking equipment for alerting traffic from both directions. Place small flags or other similarly effective small objects near freshly applied markings at frequent intervals to reduce crossing by traffic.

B. Remove and replace damaged portions of markings at no additional cost to Owner.

C. Keep painted areas free of traffic until thoroughly dry.

3.5 SIGN INSTALLATION

A. All signs to be installed using channel supports unless noted otherwise. The support(s) must be driven a minimum of 4-feet into competent soil for adequate stability. Support must not be damaged by installation equipment. Provide concrete footing at no additional cost for sites with rocks, poor soils or other similar conditions that do not allow driving the support channels. Support channels may be spliced by overlapping a minimum of 8-inch and providing two or more galvanized bolts.

1. Set bottom of traffic signs at 84-inches above finished grade, except as noted below and on the plans. Edge of traffic sign must be minimum 24-inches from face of curb.
2. Parking stall signs: Center on parking stall or in line with stall pavement parking as indicated on the plans and set top of sign at 48-inches above finished grade.

END OF SECTION

APPENDIX

Geotechnical Evaluation Report

State Capitol Restoration Project
Basement Level of the State Capitol Building
RECS Project No. 02CB0015
St. Paul, Minnesota

Prepared for

State of Minnesota

Professional Certification:
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Bradley J. McCarter, PE
Project Engineer
License Number: 48478
June 11, 2013

Project BL-13-01974

Braun Intertec Corporation

BRAUN INTERTEC

Braun Intertec Corporation
11001 Hampshire Ave S
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June 11, 2013

Project BL-13-01974

Ms. Talia Landucci-Owen
State of Minnesota
G-10 Administration Building
50 Sherburne Avenue
St. Paul, MN 55155

Re: Geotechnical Evaluation Report
State Capitol Restoration Project
Basement Level of the State Capitol Building
RECS Project No. 02CB0015
St. Paul, Minnesota

Dear Ms. Landucci-Owen:

We are pleased to present our completed *Geotechnical Evaluation Report* for the above referenced project in St. Paul, Minnesota. The purpose of this geotechnical evaluation was to characterize subsurface conditions at select exploration locations and evaluate their impact on design and construction of the proposed restoration project. We understand the results of this evaluation will then be used to design foundation systems and ground supported slabs. Details of our results and recommendations are provided in the following report.

Thank you for making Braun Intertec your geotechnical consultant for this project. If you have questions or comments regarding this report, or if there are other services that we can provide you, please feel free to contact Brad McCarter at (952.995.2268 or bmccarter@braunintertec.com) at your convenience.

Sincerely,

BRAUN INTERTEC CORPORATION

Bradley J. McCarter, PE
Project Engineer

Jeffrey A. Gebhard, PE
Vice President – Principal Engineer

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Appendix

Hand Auger Boring Location Sketch
Log of Hand Auger Boring Sheets HAB-1 through HAB-5
Descriptive Terminology of Soil

A. Introduction

A.1. Project Information

A.1.a. Site Description

The site is located within mechanical rooms on the basement level of the State Capitol Building in St. Paul, Minnesota. Each of the rooms has concrete floor slabs and existing duct work.

A.1.b. Project Description

This project will include construction of new mechanical duct work in areas under the basement level floor slab. This project was for *Base Services* only which included evaluating subsurface conditions and observing existing foundations at select locations. The foundation observations will be performed at a later date and results submitted under separate cover.

A.1.c. Purpose

The purpose of the *Base Services* for this geotechnical evaluation was to characterize subsurface geologic conditions at select exploration locations and evaluate their impact on design and construction of the mechanical duct work.

A.2. Scope of Services

Our scope of services for this project was outlined in our *Exhibit A1 - Proposal for Geotechnical Evaluation* dated April 18, 2013. The scope of services for this project is described below.

- Perform a ground penetrating radar (GPR) scan of the floor slab at exploration locations to identify underground utilities, or conduit, near the boring locations.
- Drill 5 hand auger borings (HABs) to nominal depths of about 10 feet below existing grades.
- Classify the samples obtained and preparing boring logs.
- Perform laboratory tests on select soil samples obtained.
- Provide recommendations for site grading including fill selection, placement, and compaction and the suitability of on-site soils for reuse as engineered fill.
- Provide recommendations for design and construction of spread foundations and concrete slabs-on-grade.

- Provide recommendations for lateral earth pressures for design of below grade walls.
- Submit this *Geotechnical Evaluation Report* containing logs of boring sheets, our analysis of the field and laboratory tests, and recommendations for construction of the proposed mechanical duct work.

B. Results

B.1. Hand Auger Borings

Subsurface conditions were evaluated with five (5) hand auger borings drilled at locations selected by HGA (structural engineer) and the State of Minnesota. The borings are located and identified as follows:

- HAB-1 – Mechanical Room B56
- HAB-2 – Mechanical Room B55
- HAB-3 – Mechanical Room B31
- HAB-4 – Mechanical Room B10
- HAB-5 – Mechanical Room B9

The approximate locations of each of the borings are shown on the *Soil Boring Location Sketch* provided by the State of Minnesota in the Appendix.

The samples obtained during our field exploration were returned to our office where they were visually classified in general accordance with the Unified Soil Classification System (USCS) by a member of our engineering staff. Representative samples were then selected for applicable laboratory testing. The results of laboratory tests are discussed in the following sections of this report and are shown on the boring logs in the Appendix adjacent to samples tested.

B.2. Boring Logs

B.2.a. General

Log of Boring sheets for each of our borings are included in the Appendix. The logs identify and describe geologic materials penetrated, results of DCP and laboratory tests performed on select samples obtained and our groundwater observations at the time of drilling.

Strata boundaries were inferred from changes in the hand auger samples. Because sampling was not performed continuously, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may also occur as gradual rather than abrupt transitions.

B.2.b. Geologic Origins

Geologic origins assigned to the materials shown on the boring logs and referenced within this report were based on: (1) a review of available historic information, (2) visual classification of materials during excavation, (3) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past, and (4) our previous experience at nearby sites. Because of the complex glacial and post-glacial depositional environments, geologic origins can be difficult to ascertain. A detailed investigation of the geologic history of the site was not performed.

B.3. Geologic Profile

The following is a summary of the geologic materials encountered in the hand auger borings. The profile is generally presented in the order in which they were encountered (i.e., from the ground surface down). Detailed subsurface information, including DCP and lab test results, for each of the borings can be found on the Log of Hand Auger Boring Sheets in the Appendix.

A surficial layer of concrete floor slab about 3 1/4 to 5 1/4 inches in thickness was encountered at each of the borings at the time of this evaluation.

Beneath surficial concrete in each of the borings sands and silts were encountered to the boring termination depth of about 10 feet below existing grades. The soils encountered were typically composed of fine-grained poorly-graded sand (SP) and poorly-graded sand with silt (SP-SM) along with sandy silt (ML). The penetration resistances of the dynamic cone penetrometer (DCP) ranged from 9 to 50+ blows per six inches of penetration, indicating a loose to dense condition.

We note Boring HAB-5 encountered gravel and cobbles beneath the concrete floor slab which could not be penetrated with the hand auger. The boring was offset at two nearby locations twice before these materials could be penetrated.

Groundwater was not encountered in any of the borings at the time of this exploration. It is our opinion groundwater is present below exploration depths at this site. We caution groundwater could take several

days to stabilize in boreholes and the boreholes were immediately backfilled upon completion. Seasonal and annual fluctuations of groundwater should also be anticipated.

B.4. Lab Testing

Laboratory testing of select soil samples obtained included moisture content and grain-size analysis based on a size No. 200 sieve. The results of lab testing performed are discussed in the following sections of this report and shown on the Log of Hand Auger Boring Sheets in the Appendix adjacent to samples tested.

C. Basis for Recommendations

C.1. Design Details

C.1.a. Structural Loads

This project will include construction of new mechanical duct work in areas under the basement level floor slab. Structural details, including anticipated loads, were not provided at the time of this report. We anticipate the construction will have maximum individual (column) loads of less than about 100 kips.

C.1.b. Site Grades

We anticipate existing grades will not be altered as part of this construction.

C.1.c. Precautions Regarding Changed Information

We have attempted to describe our understanding of the proposed construction to the extent it was reported to us by others. Depending on the extent of available information, assumptions may have been made based on our experience with similar projects. If we have not correctly recorded or interpreted the project details, we should be notified. New or changed information could require additional evaluation, analyses and/or recommendations.

C.2. Design and Construction Considerations

The results of this exploration indicate sands and silts are present to depths of at least 10 feet in each of the borings. These soils will provide adequate support of proposed structures using conventional spread foundations.

Materials which caused refusal to our hand auger advancement were encountered below floor slab in the area of Boring HAB-5. It is anticipated these materials could be difficult to remove and may require subcutting prior to foundation construction. These areas should be thoroughly evaluated at the time of construction to evaluate potential impact on proposed and future structures.

Care should be taken not to undermine existing footings when constructing new footings for the mechanical duct work. If during design or construction it appears as though the stability of the existing structure is in question, we should be consulted for additional recommendations.

Based on soils encountered in the borings, it appears much of the soils at this site (SP/SP-SM and some ML) are suitable for reuse as engineered fill. However, separation of layers of fine-grained soils (clays) along with moisture conditioning should be anticipated prior to reuse. Any materials to be used as structural fill or backfill should be tested and approved by the geotechnical engineer prior to placement.

Groundwater was not encountered in any of our borings at the time of this exploration, thus, groundwater control is not anticipated to be necessary during construction at this site.

D. Recommendations

D.1. Building Pad Preparation

D.1.a. Subgrade

Following concrete removal and any necessary excavations to reach finished grades, thorough surface compaction of subgrade soils should be performed prior to fill placement and/or foundation construction to densify any loose zones and reduce potential for detrimental settlement to occur.

Care should be taken not to undermine existing footings when constructing new footings for the mechanical duct work. If during design or construction it appears as though the stability of the existing structure is in question, we should be consulted for additional recommendations.

We recommend excavation bottoms be observed by a geotechnical engineer, or qualified representative, to judge if excavation bottom soils are similar to those encountered in the borings and are suitable for support of fill and/or building loads.

If necessary, we recommend oversizing (widening) excavations 1/2 foot horizontally beyond the footings for each foot excavations extend below bottom-of-footing elevations to provide lateral support of structural loads they will support.

D.1.b. Selection, Placement and Compaction of Backfill and Fill

We recommend fill and backfill materials be composed of non-organic mineral soils containing no debris and having less than 50 percent of particles passing a size No. 200 sieve. Based on the results of our borings, much of the site soils are suitable for reuse as engineered fill; however, any zones of organic material and/or more fine-grained soils (clays and silts) will need to be separated prior to reuse. Moisture conditioning should also be anticipated prior to reuse. Any material to be used as engineered fill should be tested and approved by the geotechnical engineer prior to placement.

We recommend fill and backfill be placed in loose lifts no thicker than 12 inches. Smaller compaction equipment may require thinner lifts to meet specified density.

The following table provides our soil compaction recommendations for use at this site.

Table 1. Soil Compaction Recommendations

Reference	Relative Compaction (ASTM D 698)	Moisture Content Variance from Optimum
Below Foundations	98%	-1% to +3%
Below Slabs	95%	-1% to +3%

D.1.c. OSHA Soil Classification

An OSHA approved competent person should review soil classification in the field. Excavations must comply with the requirements of Occupational Safety & Health Administration (OSHA) 29 CFR, Part 2926, Subpart P; *Excavations and Trenches*. This document states that excavation safety is the responsibility of the contractor. Reference to these OSHA requirements should be included in the project specifications.

Due to the granular nature of on site soils, soils at this site should be considered as Type C material under OSHA guidelines. Unsupported excavations should be maintained at a gradient no steeper than 1 1/2H: 1V. Slopes constructed in this manner may still exhibit surface sloughing. If site constraints do not allow the construction of temporary slopes with these dimensions, then temporary shoring may be required, and we should be consulted for additional recommendations.

D.1.d. Hydrologic Soil Classification

Based on the *Minnesota Stormwater Manual*, the fine-grained sands and silts encountered at this site fall into Hydrologic Soil Group C.

D.1.e. Soil Corrosiveness

The borings indicate the site is underlain by fine-grained sands and silts. These soils are considered non- to slightly-corrosive to metallic conduits.

D.2. Spread Footings

D.2.a. Embedment Depth

Since construction is interior, footings can be placed immediately below the slab. However, where constructed adjacent to existing footings, new footings should bear at about the same elevation.

D.2.b. Allowable Bearing Pressure

For design purposes, we recommend foundations bearing on materials encountered in the borings be designed to exert a maximum allowable soil bearing pressure of 4,000 pounds per square foot (PSF). This value includes a safety factor of at least 3.0 with regard to bearing capacity failure. We recommend strip footing be a minimum of 2 feet wide and column footing be a minimum 3 feet square to prevent shear failure.

D.2.c. Settlement

Following the recommendations provided in this report, total settlements of less than 1 inch and differential settlements of less than 1/2 inch are anticipated under the assumed loads.

D.3. Interior Slabs

D.3.a. Subgrade Modulus

We recommend using a modulus of subgrade reaction (k) of 150 pounds per square inch per inch of deflection for design of floor slabs bearing upon materials encountered.

D.3.b. Moisture Vapor Protection

If floor coverings or coatings less permeable than the concrete slab will be used, we recommend a vapor barrier be placed immediately beneath the slab. Some contractors prefer to bury the vapor barrier beneath a layer of sand to reduce curling and shrinkage, but this practice risks trapping water between the slab and vapor barrier.

Regardless of where the vapor barrier is placed, we recommend consulting with floor covering manufacturers regarding the appropriate type, use and installation of the vapor barrier to preserve warranty assurances.

D.4. Lateral Earth Pressures

Our recommended earth pressure coefficients for below grade wall design based on active, passive and at-rest earth pressure conditions are presented below in Table 2. Assumed wet unit weights, and internal friction angles are also provided.

Table 2. Recommended Lateral Earth Pressures

Backfill Material	Wet Unit Weight (PCF)	Friction Angle (degrees)	Earth Pressure Coefficient, Active Case (Ka)	Earth Pressure Coefficient, At-Rest Case (Ko)	Earth Pressure Coefficient, Passive Case (Kp)
Sand (SP/SP-SM)	120	32	0.31	0.47	3.26
Sandy Silt (ML)	120	26	0.39	0.56	2.56

We recommend a soil to concrete interface factor of 0.5 be used in design.

The recommended equivalent fluid pressures assume a level backfill with no surcharge – they would need to be revised for sloping backfill or other dead or live loads that are placed within a horizontal distance behind the walls that is equal to the height of the walls. Our design values also assume walls are drained so that water cannot accumulate behind the walls. We recommend inside faces of exterior walls be insulated to prevent frost penetration below floor slabs.

E. Construction Quality Control

E.1. Excavation Observations

We recommend having a geotechnical engineer observe any excavations related to subgrade preparation and spread footing and slab-on-grade construction. The purpose of the observations is to evaluate the competence of the geologic materials exposed in the excavations, and the adequacy of required excavation oversizing.

E.2. Materials Testing

We recommend density tests be performed during placement of backfills and fills placed beneath footings, floor slabs, and along foundation walls. Samples of proposed backfill and fill materials should be submitted to our testing laboratory at least three days prior to placement for evaluation of their suitability and determination of their optimum moisture contents and maximum dry densities.

F. Procedures

F.1. Hand Auger Borings

The borings were advanced using hand operated bucket augers in general accordance with ASTM D 6907. Penetration resistances with the DCP were performed in general accordance with ASTM D 7308. The borings were backfilled to the existing ground surface with soil cuttings and concrete floor slab patched upon completion of borings.

F.2. Material Classification and Testing

F.2.a. Visual and Manual Classification

The samples obtained were returned to our office where they were visually classified in general accordance with the Unified Soil Classification System (USCS). Representative samples were then selected for laboratory testing.

F.2.b. Laboratory Testing

The results of the laboratory tests performed on geologic material samples are noted on or follow the appropriate attached exploration logs. The tests were performed in accordance with applicable ASTM procedures.

F.3. Groundwater Measurements

Our crews checked for groundwater as the borings were advanced and again after completion. The boreholes were then backfilled upon completion.

G. Qualifications

G.1. Variations in Subsurface Conditions

G.1.a. Material Strata

Our evaluation, analyses and recommendations were developed from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth, and therefore strata boundaries and thicknesses must be inferred to some extent. Strata boundaries may also be gradual transitions, and can be expected to vary in depth, elevation and thickness away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until additional exploration work is completed, or construction commences. If any such variations are revealed, our recommendations should be re-evaluated. Such variations could increase construction costs, and a contingency should be provided to accommodate them.

G.1.b. Groundwater Levels

Groundwater measurements were made under the conditions reported herein and shown on the exploration logs and interpreted in the text of this report. It should be noted the observation period was relatively short, and groundwater can be expected to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

G.2. Continuity of Professional Responsibility

G.2.a. Plan Review

This report is based on a limited amount of information, and a number of assumptions were necessary to help us develop our recommendations. It is recommended that our firm review the geotechnical aspects of the designs and specifications, and evaluate whether the design is as expected, if any design changes have affected the validity of our recommendations, and if our recommendations have been correctly interpreted and implemented in the designs and specifications.

G.2.b. Construction Observations and Testing

It is recommended we be retained to perform observations and tests during construction. This will allow correlation of the subsurface conditions encountered during construction with those encountered by the borings, and provide continuity of professional responsibility.

G.3. Use of Report

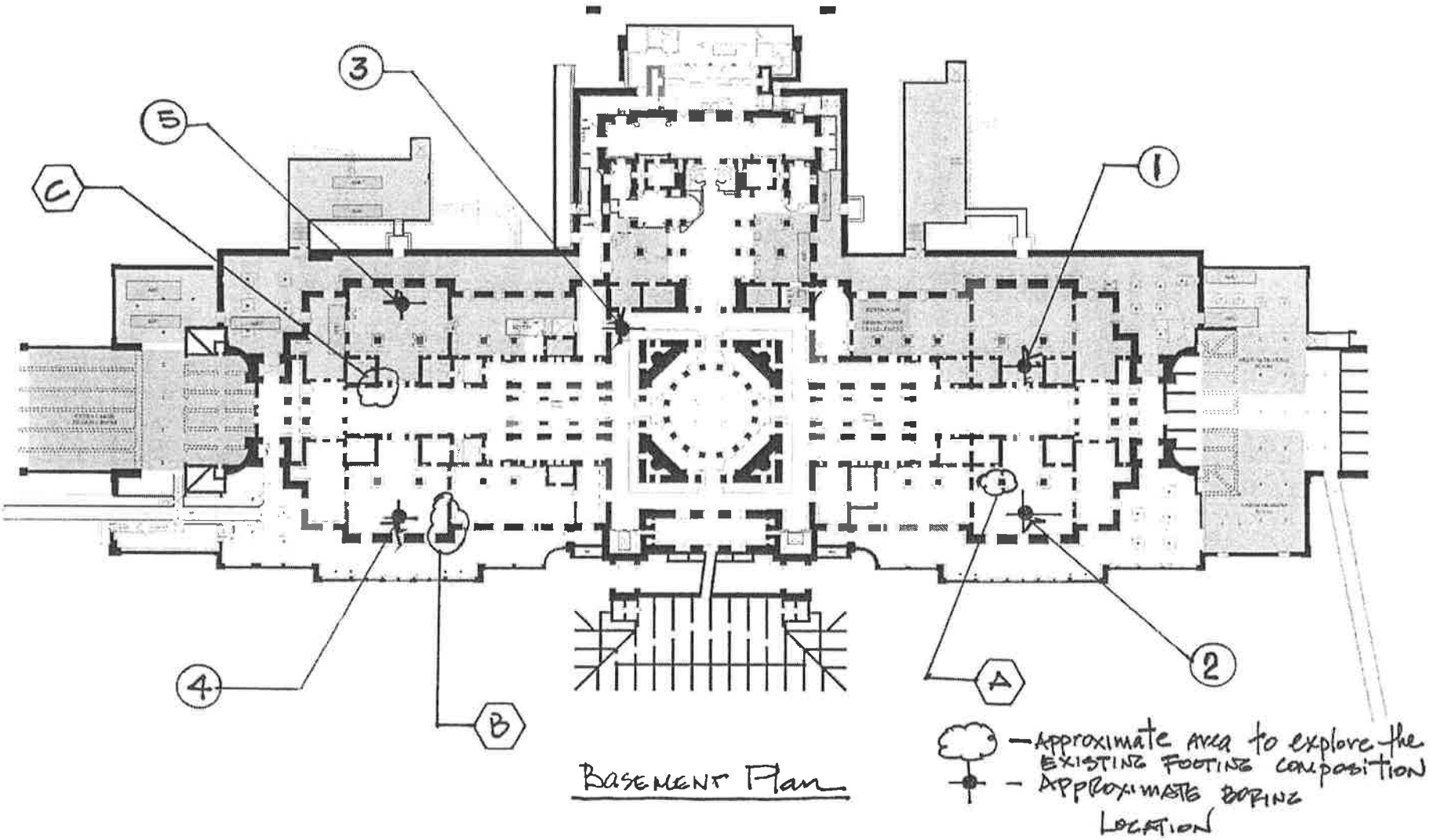
This report is for the exclusive use of the parties to which it has been addressed. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

G.4. Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix

ATTACHMENT A
Basement Plan of Capitol Building with Boring and Footing Exploration Locations



BRAUN INTERTEC

HAND AUGER BORING

Braun Project BL-13-01974
GEOTECHNICAL EVALUATION
State Capitol Restoration Project
Basement Level of the State Capitol Building
RSCS Project No. 02CB0015, St. Paul, Minnesota

HAND AUGER: **HAB-1**

LOCATION: Room B56

DRILLER: E. Knudson | METHOD: Hand Auger Probe | DATE: **5/21/13** | SCALE: **1" = 4'**

Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	DCP	MC %	Tests or Notes
0.0							
0.2	CONC	3 1/4 inches of Concrete.					
	SP	POORLY GRADED SAND, fine-grained, with Gravel, tan, dry.					
			X		31		
			X		23		
5.0							
	ML	SANDY SILT, brown, moist to wet.					
			X		49	19	P200=84%
			X		50		
10.5			X		57		
		END OF BORING.					
		Water not observed with 10 feet of bucket auger in the ground.					
		Boring then backfilled.					

See Descriptive Terminology sheet for explanation of abbreviations

HAND AUGER BORING N:\GINT\PROJECTS\MINNEAPOLIS\2013\01974.GPJ BRAUN_IC GEO DATA TEMPLATE.GDT 6/11/13

BRAUN INTERTEC

HAND AUGER BORING

Braun Project BL-13-01974
GEOTECHNICAL EVALUATION
State Capitol Restoration Project
Basement Level of the State Capitol Building
RSCS Project No. 02CB0015, St. Paul, Minnesota

HAND AUGER: **HAB-2**

LOCATION: Room B55

DRILLER: E. Knudson | METHOD: Hand Auger Probe | DATE: **5/21/13** | SCALE: **1" = 4'**

Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	DCP	MC %	Tests or Notes
0.0							
0.4	CONC	5 inches of Concrete.					
	SP-SM	POORLY GRADED SAND with SILT, fine-grained, trace of Gravel, tan, dry.					
					24		
					33	4	P200=7%
					50+		
					50+		
10.5					50+		
		END OF BORING.					
		Water not observed with 10 feet of bucket auger in the ground.					
		Boring then backfilled.					

See Descriptive Terminology sheet for explanation of abbreviations

HAND AUGER BORING N:\GINT\PROJECTS\MINNEAPOLIS\2013\01974.GPJ BRAUN_ISG.GDT 6/11/13

BRAUN INTERTEC

HAND AUGER BORING

Braun Project BL-13-01974
GEOTECHNICAL EVALUATION
State Capitol Restoration Project
Basement Level of the State Capitol Building
RSCS Project No. 02CB0015, St. Paul, Minnesota

HAND AUGER: **HAB-3**

LOCATION: Room B31

DRILLER: E. Knudson | METHOD: Hand Auger Probe | DATE: **5/21/13** | SCALE: **1" = 4'**

Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	DCP	MC %	Tests or Notes
0.0							
0.5	CONC	5 1/4 inches of Concrete.					
	SP	POORLY GRADED SAND, fine-grained, tan, dry.					
					9		
					39		
5.0							
	ML	SANDY SILT, brown, moist.					
					52	10	P200=73%
					50+		
10.5					60		
		END OF BORING.					
		Water not observed with 10 feet of bucket auger in the ground.					
		Boring then backfilled.					

See Descriptive Terminology sheet for explanation of abbreviations

HAND AUGER BORING N:\GINT\PROJECTS\MINNEAPOLIS\2013\01974.GPJ BRAUN_ISO.GDT 6/11/13

BRAUN INTERTEC

HAND AUGER BORING

Braun Project BL-13-01974
GEOTECHNICAL EVALUATION
State Capitol Restoration Project
Basement Level of the State Capitol Building
RSCS Project No. 02CB0015, St. Paul, Minnesota

HAND AUGER: **HAB-4**

LOCATION: Room B10

DRILLER: E. Knudson | METHOD: Hand Auger Probe | DATE: **5/21/13** | SCALE: **1" = 4'**

Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	DCP	MC %	Tests or Notes
0.0							
0.3	CONC	5 inches of Concrete.					
	SP	POORLY GRADED SAND, fine-grained, tan, dry.					
			X		25		
			X		46		
6.0							
	ML	SANDY SILT, brown, moist.	X		54	12	P200=78%
8.0							
	SP-SM	POORLY GRADED SAND with SILT, fine-grained, tan, dry.	X		56		
10.5			X		60		
		END OF BORING.					
		Water not observed with 10 feet of bucket auger in the ground.					
		Boring then backfilled.					

See Descriptive Terminology sheet for explanation of abbreviations

HAND AUGER BORING N:\GINT\PROJECTS\MINNEAPOLIS\2013\01974.GPJ BRAUN_US.GDT 6/11/13

BRAUN INTERTEC

HAND AUGER BORING

Braun Project BL-13-01974
GEOTECHNICAL EVALUATION
State Capitol Restoration Project
Basement Level of the State Capitol Building
RSCS Project No. 02CB0015, St. Paul, Minnesota

HAND AUGER: **HAB-5**

LOCATION: Room B9

DRILLER: E. Knudson | METHOD: Hand Auger Probe | DATE: **5/21/13** | SCALE: **1" = 4'**

Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	DCP	MC %	Tests or Notes
0.0							
0.3	CONC	3 1/2 inches of Concrete.					
	SP	POORLY GRADED SAND, fine-grained, trace of Gravel, tan, dry.			29		
4.0							
	ML	SANDY SILT, brown, wet.			50+		
6.0							
	SP-SM	POORLY GRADED SAND with SILT, fine-grained, tan, dry.			50+	4	P200=8%
					55		
10.5					50+		

END OF BORING.

Water not observed with 10 feet of bucket auger in the ground.

Boring then backfilled.

Boring encountered refusal below concrete slab. Two offsets performed at nearby locations. This log reflects the second offset.

HAND AUGER BORING N:\GINT\PROJECTS\MINNEAPOLIS\2013\01974.GPJ BRAUN_ISG DESCRIPTIVE TERMINOLOGY sheet for explanation of abbreviations)

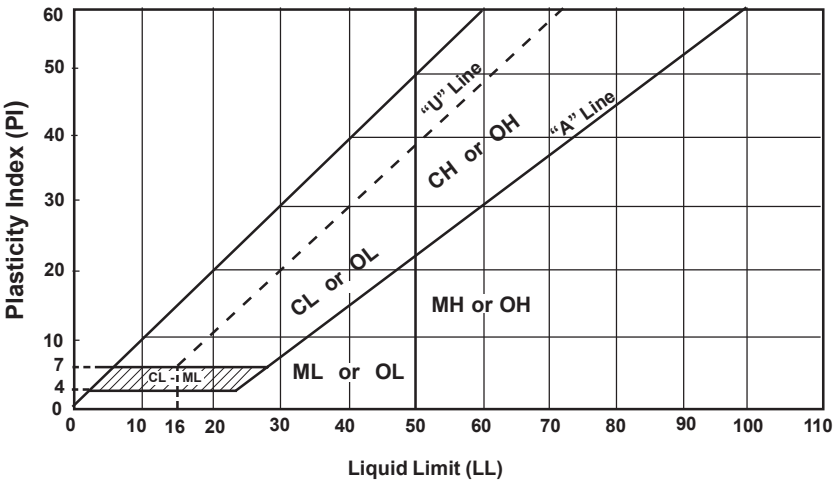
BRAUN INTERTEC

Descriptive Terminology of Soil

Standard D 2487 - 00
Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [a]				Soils Classification	
				Group Symbol	Group Name [b]
Coarse-grained Soils more than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels 5% or less fines [e]	$C_u \geq 4$ and $1 \leq C_c \leq 3$ [c]	GW	Well-graded gravel [d]
			$C_u < 4$ and/or $1 > C_c > 3$ [c]	GP	Poorly graded gravel [d]
		Gravels with Fines More than 12% fines [e]	Fines classify as ML or MH	GM	Silty gravel [d f g]
			Fines classify as CL or CH	GC	Clayey gravel [d f g]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands 5% or less fines [i]	$C_u \geq 6$ and $1 \leq C_c \leq 3$ [c]	SW	Well-graded sand [h]
			$C_u < 6$ and/or $1 > C_c > 3$ [c]	SP	Poorly graded sand [h]
		Sands with Fines More than 12% [i]	Fines classify as ML or MH	SM	Silty sand [f g h]
			Fines classify as CL or CH	SC	Clayey sand [f g h]
Fine-grained Soils 50% or more passed the No. 200 sieve	Silts and Clays Liquid limit less than 50	Inorganic	PI > 7 and plots on or above "A" line [j]	CL	Lean clay [k l m]
			PI < 4 or plots below "A" line [j]	ML	Silt [k l m]
		Organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic clay [k l m n]
				OL	Organic silt [k l m o]
	Silts and clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay [k l m]
			PI plots below "A" line	MH	Elastic silt [k l m]
		Organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay [k l m p]
				OH	Organic silt [k l m q]
Highly Organic Soils		Primarily organic matter, dark in color and organic odor		PT	Peat

a. Based on the material passing the 3-in (75mm) sieve.
b. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders or both" to group name.
c. $C_u = D_{60} / D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
d. If soil contains ≥15% sand, add "with sand" to group name.
e. Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
f. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
g. If fines are organic, add "with organic fines" to group name.
h. If soil contains ≥ 15% gravel, add "with gravel" to group name.
i. Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay
j. If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.
k. If soil contains 10 to 29% plus No. 200, add "with sand" or "with gravel" whichever is predominant.
l. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
m. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
n. PI ≥ 4 and plots on or above "A" line.
o. PI < 4 or plots below "A" line.
p. PI plots on or above "A" line.
q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	**OC**	Organic content, %
WD	Wet density, pcf	**S**	Percent of saturation, %
MC	Natural moisture content, %	**SG**	Specific gravity
LL	Liqiuid limit, %	**C**	Cohesion, psf
PL	Plastic limit, %	∅	Angle of internal friction
PI	Plasticity index, %	**qu**	Unconfined compressive strength, psf
P200	% passing 200 sieve	**qp**	Pocket penetrometer strength, tsf

Particle Size Identification

Boulders ..... over 12"
Cobbles ..... 3" to 12"
Gravel
Coarse ..... 3/4" to 3"
Fine ..... No. 4 to 3/4"
Sand
Coarse ..... No. 4 to No. 10
Medium ..... No. 10 to No. 40
Fine ..... No. 40 to No. 200
Silt ..... < No. 200, PI < 4 or below "A" line
Clay ..... < No. 200, PI ≥ 4 and on or above "A" line

Relative Density of Cohesionless Soils

Very loose ..... 0 to 4 BPF
Loose ..... 5 to 10 BPF
Medium dense ..... 11 to 30 BPF
Dense ..... 31 to 50 BPF
Very dense ..... over 50 BPF

Consistency of Cohesive Soils

Very soft ..... 0 to 1 BPF
Soft ..... 2 to 3 BPF
Rather soft ..... 4 to 5 BPF
Medium ..... 6 to 8 BPF
Rather stiff ..... 9 to 12 BPF
Stiff ..... 13 to 16 BPF
Very stiff ..... 17 to 30 BPF
Hard ..... over 30 BPF

Drilling Notes

Standard penetration test borings were advanced by 3 1/4" or 6 1/4" ID hollow-stem augers unless noted otherwise, Jetting water was used to clean out auger prior to sampling only where indicated on logs. Standard penetration test borings are designated by the prefix "ST" (Split Tube). All samples were taken with the standard 2" OD split-tube sampler, except where noted.

Power auger borings were advanced by 4" or 6" diameter continuous-flight, solid-stem augers. Soil classifications and strata depths were inferred from disturbed samples augered to the surface and are, therefore, somewhat approximate. Power auger borings are designated by the prefix "B."

Hand auger borings were advanced manually with a 1 1/2" or 3 1/4" diameter auger and were limited to the depth from which the auger could be manually withdrawn. Hand auger borings are indicated by the prefix "H."

BPF: Numbers indicate blows per foot recorded in standard penetration test, also known as "N" value. The sampler was set 6" into undisturbed soil below the hollow-stem auger. Driving resistances were then counted for second and third 6" increments and added to get BPF. Where they differed significantly, they are reported in the following form: 2/12 for the second and third 6" increments, respectively.

WH: WH indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WR: WR indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

TW indicates thin-walled (undisturbed) tube sample.

Note: All tests were run in general accordance with applicable ASTM standards.

PROJECT MANUAL PHOTO SHEETS
TABLE OF CONTENTS

This book of photographs is an integral part of the Project Contract Documents. Photographs in this book are generally organized into categories of broad elements or systems of the Project. The photograph sheets are typically indexed in the category that represents the principal importance of the work. The placement of a photograph in a particular category shall not be construed as meaning that the photograph does not contain information related to other work.

By the nature of photographs, no attempt has been made, nor shall there be any interpretations made, to identify the photographs with trade or supply jurisdictions. Bidders and Contractors are cautioned that all photographs, including those primarily applicable to other trades or contracts, must be examined to determine the scope, nature and affect all of the photographs will have on their work.

Divisions:

00. PROCUREMENTS AND CONTRATING REQ. (not used)

01. GENERAL REQUIREMENTS (not used)

02. EXISTING CONDITIONS
024119 Selective Demolition

21. FIRE SUPRESSION (not used)

22. PLUMBING (not used)

23. HEATING, VENTILATING, AND AIR CONDITIONING (not used)

26. ELECTRICAL (not used)

27. COMMUNICATIONS (not used)

31. EARTHWORK (not used)

32. EXTERIOR IMPROVEMENTS (not used)