



Division of Finance and Business Operations

Wayne State University

USB Roof & Structure Repairs

WSU Project Number 060-313960

Prevailing Wage Work

Note – Electronic Bid Submissions

FOR:

Board of Governors
Wayne State University
Detroit, Michigan

Owner's Representative:

Allen Gigliotti, Project Manager
Facilities Planning & Management
Design & Construction Services
5454 Cass
Wayne State University
Detroit, Michigan 48202

Owner's Agent:

Valerie Kreher, Senior Buyer
WSU – Procurement & Strategic Sourcing
5700 Cass, Suite 4200
Detroit, Michigan 48202
313-577-3720 / 313-577-3747 fax
rfpteam2@wayne.edu and copy
leiann.day@wayne.edu

Consultant:

WGI
5136 Lovers Lane, Suite 200
Kalamazoo, MI 49002

July 9, 2018



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INFORMATION FOR BIDDERS

OWNER: Board of Governors
Wayne State University

PROJECT: **USB Roof & Structure Repairs**
Project No. **060-313960**

LOCATION: Wayne State University
5454 Cass Avenue, Detroit, MI 48202
Detroit, Michigan 48202

OWNER'S AGENT: **Valerie Kreher, Senior Buyer**
WSU – Procurement & Strategic Sourcing
5700 Cass, Suite 4200
Detroit, Michigan 48202
313-577-3720 / 313-577-3747 fax
rfpteam2@wayne.edu & copy leiann.day@wayne.edu

OWNER'S REPRESENTATIVE: **Allen Gigliotti, Project Manager**
Facilities Planning & Management
Design & Construction Services
Wayne State University
5454 Cass Avenue
Detroit, Michigan 48202

Architect: **WGI**
5136 Lovers Lane, Suite 200
Kalamazoo, MI 49002

SPECIAL NOTE: Right to reject any and all proposals, either in whole or in part and to waive any irregularities therein is reserved by the Owner.

BIDS ADVERTISED: **July 9, 2018**

BIDDING: Bidding documents may be obtained by vendors from the University Purchasing Web Site at <http://go.wayne.edu/bids> beginning **July 9, 2018**. When visiting the Web Site, click on the "**Construction**" link in green. Copies of the RFP will not be available at the pre-proposal meeting.

MANDATORY Pre-Bid Conference: **11:00 AM, local time, July 17, 2018** to be held at Wayne State University – **5454 Cass Avenue, Detroit, MI 48202, Conference Room 3**, Detroit, MI, 48202. Late Arrivals may not be permitted to submit bids.

OPTIONAL Second Walk Through (if needed): **To be determined at the conclusion of the pre-bid conference, by those in attendance.**

DUE DATE FOR QUESTIONS: Due Date for questions shall be **July 20, 2018 at 12:00 Noon**. All questions must be reduced to writing and emailed to the attention of **Valerie Kreher, Senior Buyer** at **rfpteam2@wayne.edu**, copy to **Leiann Day, Associate Director** at: **leiann.day@wayne.edu**.

Bids Due: Sealed proposals for lump-sum General Contract will be received at the office of the Procurement & Strategic Sourcing **by electronic submission on July 25, 2018**, until 2:00 p.m. (local time). The link for bid submission will be posted with the bid details at <http://go.wayne.edu/bids> beginning **July 9, 2018**.

No public bid opening will be held.

Bid Qualification Meeting: Bidders must be available for bid prequalification meeting the day following the bid opening. The lowest qualified bidder will be contacted and requested to meet with Facilities Planning & Management



at their office located at 5454 Cass Avenue, Detroit, MI 48202. During the bid qualification, the Vendor must provide a Project Schedule and a Schedule of Values, including a list of Contractor's suppliers, subcontractors and other qualifications.

An unsigned contract will be given to the successful Contractor at the conclusion of the bid qualification meeting, if all aspects of the bid are in order. The Contractor has 5 business days to return the contract to the Project Manager for University counter signature. The contractor must also submit a Performance Bond as outlined above and a Certificate of Insurance in the same 5 business day period. In the event the Contractor fails to return the documents in this 5 day period, the University reserves the right to award the contract to the next most responsive bidder.

All available information pertaining to this project will be posted to the Purchasing web site at

<http://go.wayne.edu/bids>.

Information that is not posted to the website is not available/not known



INSTRUCTIONS TO BIDDERS

OWNER: Board of Governors
Wayne State University

PROJECT: **USB Roof & Structure Repairs**
Project No. **060-313960**

LOCATION: Wayne State University
5454 Cass Avenue, Detroit, MI 48202,
Detroit, Michigan 48202

OWNER'S AGENT: **Valerie Kreher, Senior Buyer**
WSU – Procurement & Strategic Sourcing
5700 Cass, Suite 4200
Detroit, Michigan 48202
313-577-3720 / 313-577-3747 fax
rfpteam2@wayne.edu & copy leiann.day@wayne.edu

1. PROPOSALS

- A. The Purchasing Agent will receive sealed Proposals for the work as herein set forth at the place and until the time as stated in the "Information for Bidders", a copy of which is bound herewith in these specifications. **No public bid opening will be held.**
- B. Proposals shall be for a **lump-sum General Contract for the entire work of the Project as provided in the Form of Proposal.**
- C. Proposals shall be submitted **by electronic submission** on forms furnished with the Bidding documents. The link for bid submission will be posted with the bid details at **<http://go.wayne.edu/bids>** beginning **July 9, 2018**. The forms must be fully filled out in ink or typewritten with the signature in longhand, and the completed forms shall be without alterations, interlineations, or erasures. Forms shall contain no recapitulations of the work to be done. Each proposal shall be delivered in an opaque sealed envelope, marked **"PROPOSAL"** AND SHALL BEAR THE NAME OF THE PROJECT AND THE NAME OF THE BIDDER. Proposals submitted by telephone or telegraph will not be accepted. Modifications by telephone or telegraph to previously submitted proposals will not be accepted.
- D. (**revised 5-29-2009**) All base bids must be conforming to the detailed specifications and drawings provided by the University, including any Addenda issued. Voluntary Alternates will only be considered if the Contractor has also submitted a conforming base bid. Any stipulation of voluntary alternates or qualifications contrary to the Contract requirements made by the Bidder in or accompanying his proposal as a condition for the acceptance of the Contract will not be considered in the award of the Contract and will cause the rejection of the entire Proposal.
- E. **The competency and responsibility of Bidders will be considered in making the award. The Owner does not obligate himself to accept the lowest or any other bids. The Owner reserves the right to reject any and all bids and to waive any informalities in the Proposals.**

2. PROPOSAL GUARANTEE (revised 3-22-2012)

- A. A certified check or bank draft payable to the Owner, or satisfactory Bid Bond executed by the Bidder and Surety Company, in an amount equal to not less than five percent (5%) of the maximum proposal amount shall be submitted with each Proposal, which amount may be forfeited to the Board of Governors, Wayne State University, if the successful Bidder refuses to enter into a Contract within ninety (90) days from receipt of Proposals.



- B. Bond must be issued by a Surety Company with an "A rating as denoted in the AM Best Key Rating Guide"
- C. The bid deposit of all bidders except the lowest three will be returned within three (3) days after the bids are opened. After the formal Contract and bonds are approved, the bid deposit will be returned to the lowest three bidders, except when forfeited.
- D. Bid bonds shall be accompanied by a Power of Attorney authorizing the signer of the bond to do so on behalf of the Surety Company.
- E. Withdrawal of Proposals is prohibited for a period of ninety (90) days after the actual date of opening thereof.

3. CONTRACT SECURITY (revised 3-22-2012)

- A. The successful Bidder will be required to furnish a Performance Bond and Labor and Material Payment bond in an amount equal to 100% of the contract award amount, and include such cost in the Proposal, complying with the laws of the State of Michigan. The graduated formula no longer applies.
- B. Performance Bond and Labor and Material Payment Bond shall be from a surety company acceptable to the Owner and made payable as follows:
 - (1) A bond for 100% of the contract award amount to the Board of Governors of Wayne State University, and guaranteeing the payment of all subcontractors and all indebtedness incurred for labor, materials, or any cause whatsoever on account of the Contractor in accordance with the laws of the State of Michigan relating to such bonds.
 - (2) A bond for 100% of the contract award amount to the Board of Governors of Wayne State University to guarantee and insure the completion of work according to the Contract.
- C. The only acceptable Performance Bond shall be the AIA A312 – 2010.
- D. Bond must be issued by a Surety Company with an "A rating as denoted in the AM Best Key Rating Guide".

4. BOND CLARIFICATION

For bids below \$50,000.00,

- A. Bid bond will not be required.
- B. Performance Bond will not be required.

5. INSPECTION

- A. Before submitting his Proposal, each Bidder shall be held to have visited the site of the proposed work and to have familiarized himself as to all existing conditions affecting the execution of the work in accordance with the Contract Documents. No allowance or extra consideration on behalf of the Contractor will subsequently be made by reason of his failure to observe the Conditions or on behalf of any subcontractor for the same reason.

6. EXPLANATION TO BIDDERS AND ADDENDA

- A. Neither the Owner nor Representative nor Purchasing Agent will give verbal answers to any inquiries regarding the meaning of drawings and specifications, and any verbal statement regarding same by any person, previous to the award, shall be unauthoritative.



- B. Any explanation desired by Bidders must be requested of the Purchasing Agent in writing, and if explanation is necessary, a reply will be made in the form of an Addendum, a copy of which will be forwarded to each Bidder registered on the Bidders' List maintained by Procurement & Strategic Sourcing.
- C. All addenda issued to Bidders prior to date of receipt of Proposals shall become a part of these Specifications, and all proposals are to include the work therein described.

7. INTERPRETATION OF CONTRACT DOCUMENTS

- A. If any person contemplating submitting a bid for the proposed Contract is in doubt as to the true meaning of any part of the drawings, specifications, or other Contract Documents, he may submit to the Purchasing Agent, a written request for an interpretation thereof. The person submitting the request will be responsible for its prompt delivery. Any interpretation of the Contract Documents will be made by an addendum duly issued. A copy of such addendum will be mailed and delivered to each registered Bidder. Each proposal submitted shall list all addenda, by numbers, which have been received prior to the time scheduled for receipt of proposal.

8. SUBSTITUTION OF MATERIALS AND EQUIPMENT*

- A. Whenever a material, article or piece of equipment is identified on the Drawings or in the Specifications by reference to manufacturers' or vendors' names, trade names, catalog numbers, or the like, it is so identified for the purpose of establishing a standard, and any material, article, or piece of equipment of other manufacturers or vendors which will perform adequately the duties imposed by the general design will be considered equally acceptable provided that the material, article, or piece of equipment so proposed is, in the opinion of the Architect, of equal substance, appearance and function. It shall not be purchased or installed by the Contractor without the Architect's written approval.

9. TAXES

- A. The Bidder shall include in his lump sum proposal and make payment of all Federal, State, County and Municipal taxes, including Michigan State Sales and Use Taxes, now in force or which may be enacted during the progress and completion of the work covered. Information regarding the State of Michigan sales and use tax laws can be found in [SOM Revenue Administrative Bulletin 2016-18](#).

10. REQUIREMENTS FOR SIGNING PROPOSALS AND CONTRACTS

- A. The following requirements must be observed in the signing of proposals that are submitted:
 - (1) Proposals that are not signed by individuals making them shall have attached thereto a Power of Attorney, evidencing the authority to sign the Proposal in the name of the person for whom it is signed.
 - (2) Proposals that are signed for partnership shall be signed by all of the partners or by an Attorney-in-Fact. If signed by an Attorney-in-Fact, there must be attached to the Proposal a Power of Attorney evidencing authority to sign the Proposal, executed by the partners.
 - (3) Proposals that are signed for a corporation shall have the correct corporate name thereof and the signature of the President or other authorized officer of the corporation, manually written in the line of the Form of Proposal following the words "signed by". If such a proposal is signed by an official other than the President of the Corporation, a certified copy of resolution of the Board of Directors, evidencing the authority of such official to sign the bid, shall be attached to it. Such proposal shall also bear the attesting signature of the Secretary of the Corporation and the impression of the corporate seal.



11. QUALIFICATIONS OF BIDDERS

- A. The Owner may request each of the three (3) low bidders to submit information necessary to satisfy the Owner that the Bidder is adequately prepared to fulfill the Contract. Such information may include past performance records, list of available personnel, plant and equipment, description of work that will be done simultaneously with the Owner's Project, financial statement, or any other pertinent information. This information and such other information as may be requested will be used in determining whether a Bidder is qualified to perform the work required and is responsible and reliable.

12. SPECIAL REQUIREMENTS

- A. The attention of all Bidders is called to the General Conditions, Supplementary General Conditions, and Special Conditions, of which all are a part of the Specifications covering all work, including Subcontracts, materials, etc. Special attention is called to those portions dealing with Labor Standards, including wages, fringe benefits, Equal Employment Opportunities, and Liquidated Damages.
- B. Prior to award of the project, the apparent low bidder will be required to produce a schedule of values which will include the proposed subcontractors for each division of work and whether the subcontractor is signatory or non-signatory. A contract will not be issued to the apparent low bidder until this document is provided. A contractor will have one week to produce this document. If the required document is not received within this time, the bidder will be disqualified.

13. NOTICE OF AWARD/ACCEPTANCE OF BID PROPOSAL (revised 12-15-2009)

- A. The Proposal shall be deemed as having been accepted when a copy of the Contract (fully executed by both the vendor and the appropriate signatory authority for the University), with any/all Alternates, Addenda, and Pre-Contract Bulletins, as issued by the office or agent of the Owner has been duly received by the Contractor. After signing the Contracts, the Contractor shall then return all copies, plus any required bonds and certificates of insurance, to the office of the Owner's Representative, at 5454 Cass, Wayne State University, Detroit, MI 48202. Construction will begin when the fully-executed contract has been returned to the Contractor.

14. TIME OF STARTING AND COMPLETION

- A. It is understood that the work is to be carried through to substantial completion with the utmost speed consistent with good workmanship and to meet the established start and completion dates.
- B. The Contractor shall begin work under the Contract without delay, upon receipt of a fully-executed contract from the Owner, and shall substantially complete the project ready for unobstructed occupancy and use of the Owner for the purposes intended within the completion time stated in the Contract.
- C. The Contractor shall, immediately upon receipt of fully-executed contract, schedule his work and expedite deliveries of materials and performance of the subcontractors to maintain the necessary pace for start and completion on the aforementioned dates.

15. CONTRACTOR'S PERFORMANCE EVALUATION (2-2015)

In an effort to provide continuous process improvement regarding the construction of various university projects, Wayne State University is embarking upon a process of evaluating the contractor's overall performance following the completion of work. At the conclusion of the construction project a subjective evaluation of the Contractor's performance will be prepared by the Project Manager and the supervising Director of Construction. The evaluation instrument that will be used in this process is shown in Section 00440-01 - Contractor's Performance Evaluation.

16. BIDDING DOCUMENTS



- A. Bid specifications are not available at the University, but are available beginning **July 9, 2018** through Wayne State University Procurement & Strategic Sourcing's Website for Advertised Bids: **<http://go.wayne.edu/bids>**. The plans for this project can be viewed in advance and/or printed from the above website. Copies of the RFP will not be available at the pre-proposal meeting.

B. **DOCUMENTS ON FILE (revised 12-2007)**

- (1) *Wayne State University Procurement & Strategic Sourcing's Website.*
All available information pertaining to this project will be posted to the Purchasing web site at **<http://go.wayne.edu/bids>**.
Information that is not posted to the website is not available/not known.
- (2) Notification of this Bid Opportunity has been sent to those entities registered with our ListServ. Available ListServes can be found at
http://www.forms.procurement.wayne.edu/Adv_bid/Adv_Bid_Listserve.html
- (3) Please note: Effective December 1, 2007, bid notices will be sent only to those Vendors registered to receive them via our Bid Opportunities list serve. To register, to
<http://go.wayne.edu/bids>, and click on the "Join our Listserve" link at the top of the page.

15. **Smoke and Tobacco-Free Policies (9-2015)**

On August 19, 2015, Wayne State joined hundreds of colleges and universities across the country that have adopted smoke- and tobacco-free policies for indoor and outdoor spaces. Contractors are responsible to ensure that all employees and all subcontractors' employees are in compliance anytime they are on WSU's main, medical, or extension center campuses. The complete policy can be found at <http://wayne.edu/smoke-free/policy/>.



NOTICE OF MANDATORY PRE-BID CONFERENCE

PROJECT: **USB Roof & Structure Repairs,**

PROJECT NOS.: **WSU PROJECT NO. 060-313960**

It is **MANDATORY** that each Contractor proposing to bid on this work must attend a pre-bid conference at the following location:

Wayne State University
5454 Cass Avenue
Conference Room 3
Detroit MI 48202

11:00 AM, local time, July 17, 2018

Please use our online registration form at <https://forms.wayne.edu/5aa587e3de04c#form-9162>, to indicate your attendance at our mandatory Pre-proposal meeting to be held on, **July 17, 2018 at 11:00 AM** and your intent to submit a proposal for the services listed.

The purpose of this conference is to clarify the procedures, scope of work, and to identify any omissions and/or inconsistencies that may impede preparation and submission of representative competitive bids.

In the event that less than 4 individual contractor firms attend the pre-bid conference, the University reserves the right, at its sole discretion, to either reschedule the pre-bid conference or proceed and offer a second pre-bid conference date. (Attendance at only one pre-bid conference will be required).

An attendance list shall be prepared and minutes of the conference shall be furnished to all those attending.

Any clarifications or corrections that cannot be made at the conference will be by Addendum.

For your convenience a map of the University and appropriate parking lots can be downloaded and printed from: <http://campusmap.wayne.edu/>. Guest parking in any of the University student and guest lots is **\$7.75**. A detailed list of Cash & Coin operated lots can be viewed at http://procurement.wayne.edu/cash_and_credit_card_lots.php. Cash lots dispense change in quarters. Due to time constraints, Vendors are encouraged to avoid parking at meters on the street (especially blue "handicapped" meters).

All available information pertaining to this project will be posted to the Purchasing web site at

<http://go.wayne.edu/bids>.

Information that is not posted to the website is not available/not known.



AGENDA

- I. Welcome and Introductions
 - A. Wayne State University Representatives
 - B. Vendor Representatives
 - C. Sign in Sheet- be sure to include your company name and representative in attendance on the sign in sheet.
- II. Brief Overview of Wayne State University
 - A. Purpose and Intent of RFP.
 - B. Detailed review of the RFP and the requirements for a qualified response.
 - C. Review of all pertinent dates and forms that are REQUIRED for a qualified response.
- III. Vendor Questions/Concerns/Issues
 - A. Questions that can be answered directly by the appropriate person in this meeting will be answered and both question and answer will be recorded in the minutes of the meeting.
 - B. Questions that need to be researched will be answered and a nature of clarification will be emailed to the appropriate ListServ. See http://www.forms.purchasing.wayne.edu/Adv_bid/Adv_Bid_Listserve.html for a list of ListServ Bid Lists.
 - C. Minutes will be emailed to the appropriate ListServ.
 - D. Questions and concerns that come up after this meeting are to be addressed to **Valerie Kreher**, Procurement & Strategic Sourcing. Discussion with other University members is seriously discouraged and could lead to disqualification from further consideration. All questions and answers will be recorded and emailed to all participants of the RFP.
 - E. Due date for questions is **July 20, 2018, 12:00 noon**.
- IV. Minimum Participation
 - A. Pre-registration for the Pre-Bid meeting is required. In the event that we do not have four (4) or more eligible bidders pre-registered, the University reserves the right to postpone the Pre-bid meeting with up to 4 business hour notice.
 - B. If less than 4 individual contractor firms attend the mandatory pre-bid meeting, the University reserves the right, at its sole discretion, to either reschedule the pre-bid conference or proceed and offer a second pre-bid conference date. (Attendance at only one pre-bid conference will be required).
 - C. On the day of the bid opening, if less than 3 sealed bids are received, the University reserves the right, at its sole discretion, to rebid the project in an effort to obtain greater competition. If the specifications are unchanged during the rebid effort, any contractor who submitted a bid will be given the option of keeping its bid on file for opening after the second bid effort, or of having the bids returned to them unopened.
- V. Proposal Due Date- **July 25, 2018, 2:00 p.m.**
- VI. Final Comments
- VII. Adjourn



VENDOR NAME _____

GENERAL CONTRACT - PROPOSAL FORM (revised 4 - 2017)

Sealed proposals for lump-sum General Contract will be received at the office of the Procurement & Strategic Sourcing **by electronic submission on July 25, 2018**, until 2:00 p.m. (local time). The link for bid submission will be posted with the bid details at <http://go.wayne.edu/bids> beginning **July 9, 2018**.

Please Note – Vendors must Pre-qualify themselves when responding to this bid opportunity. Our Prequalification questions can be found on page 4 of this section.

OWNER: Board of Governors
Wayne State University

PROJECT: **USB Roof & Structure Repairs**

PROJECT NO.: WSU PROJECT NO. **060-313960**

PROJECT TYPE: **Roofing & Cement Work**

PURCHASING AGENT: **Valerie Kreher, Senior Buyer**
WSU – Procurement & Strategic Sourcing
5700 Cass, Suite 4200
Detroit, Michigan 48202
313-577-3720/ 313-577-3747 fax
rfpteam2@wayne.edu & copy leiann.day@wayne.edu

OWNER'S REPRESENTATIVE: **Allen Gigliotti, Project Manager**
Design & Construction Services
Facilities Planning & Management
Wayne State University
5454 Cass Avenue
Detroit, Michigan 48202

TO: Board of Governors
Wayne State University
Detroit, Michigan

BASE PROPOSAL:

The undersigned agrees to enter into an Agreement to complete the entire work of the **USB Roof & Structure Repairs** project (WSU Project No. **060-313960**) in accordance with the Bidding Documents for the following amounts:

_____ \$ _____ Dollars

ALTERNATES: The following alternates to the base proposal(s) are required to be offered by the respective bidder. The undersigned agrees that the following amounts will be added to or deducted from the base bid as indicated, for each alternate which is accepted.

ALTERNATE NO. 1:

The undersigned agrees to enter into an agreement to complete the Alternate # 1 **Roof Area A** - Remove and replace existing roofing as indicated on Drawings



and to provide all labor and material associated with the work in accordance with the Bidding Documents for the following amounts:

(select one) ADD _____ \$ _____ Dollars

or
DEDUCT _____ \$ _____ Dollars

ALTERNATE NO. 2:

The undersigned agrees to enter into an agreement to complete the Alternate # 2 **Roof Area B** - Remove and replace existing roofing as indicated on Drawings and to provide all labor and material associated with the work in accordance with the Bidding Documents for the following amounts:

(select one) ADD _____ \$ _____ Dollars

or
DEDUCT _____ \$ _____ Dollars

ALTERNATE NO.3:

The undersigned agrees to enter into an agreement to complete the Alternate # 3 **Roof Area C** - Remove and replace existing roofing as indicated on Drawings and to provide all labor and material associated with the work in accordance with the Bidding Documents for the following amounts:

(select one) ADD _____ \$ _____ Dollars

or
DEDUCT _____ \$ _____ Dollars

ALTERNATE NO. 4:

The undersigned agrees to enter into an agreement to complete the Alternate # 4 **Roof Area D** - Remove and replace existing roofing as indicated on Drawings and to provide all labor and material associated with the work in accordance with the Bidding Documents for the following amounts:

(select one) ADD _____ \$ _____ Dollars

or
DEDUCT _____ \$ _____ Dollars



ALTERNATE NO. 5:

The undersigned agrees to enter into an agreement to complete the Alternate # 5
Roof Area E - Remove and replace existing roofing as indicated on Drawings
and to provide all labor and material associated with the work in accordance with
the Bidding Documents for the following amounts:

(select one) ADD _____ \$ _____ Dollars

or
DEDUCT _____ \$ _____ Dollars

ALTERNATE NO.6:

The undersigned agrees to enter into an agreement to complete the Alternate # 6
Roof Area F and Area F1, F2 & F3 - Remove and replace existing roofing as
indicated on Drawings and to provide all labor and material associated with the
work in accordance with the Bidding Documents for the following amounts:

(select one) ADD _____ \$ _____ Dollars

or
DEDUCT _____ \$ _____ Dollars

ALTERNATE NO. 7:

The undersigned agrees to enter into an agreement to complete the Alternate # 7
Galvanic Anodes - Install galvanic anodes at concrete repairs as indicated on
Drawings and to provide all labor and material associated with the work in
accordance with the Bidding Documents for the following amounts:

(select one) ADD _____ \$ _____ Dollars

or
DEDUCT _____ \$ _____ Dollars

ALTERNATE NO. 8:

The undersigned agrees to enter into an agreement to complete the Alternate # 8
Accelerated Construction Schedule - Provide alternate to accelerate construction
schedule for Phase 2, 3 and 4 concrete repairs, while complying with local noise
ordinances. Provide description of how you plan to accelerate schedule (double
shift, weekend work, large crew, etc.). Provide alternate schedule showing
proposed duration and completion date(s). Provide cost, if any, to complete work
in accordance with the proposed accelerated construction schedule and to
provide all labor and material associated with the work in accordance with the
Bidding Documents for the following amounts:



(select one) ADD _____ \$ _____ Dollars

or
DEDUCT _____ \$ _____ Dollars

UNIT PRICING (as listed in the detailed specifications, section - _____).

Work Item	Work Item Description	Ref. Spec. or Detail	Units	Total Bid Quantity	Unit Cost	Extended Cost
3.1	Top of Slab Repair at SOG	2/SR501	S.F.	60	\$	\$
3.2	Top of Slab Repair at Supported Slab	2/SR501	S.F.	5,300	\$	\$
3.3	Top of Slab Repair at Asphalt Patches	2/SR501	S.F.	660	\$	\$
3.4	Concrete Overlay Repair	5/SR501	S.F.	480	\$	\$
3.5	Topping Repair at Level 3	4/SR501	S.F.	1,800	\$	\$
3.6	Structural Slab Repair at Level 3	2/SR501	S.F.	900	\$	\$
3.7	Full Depth Slab Repair	3/SR501	S.F.	400	\$	\$
3.8	Ceiling Repair	6/SR501	S.F.	1,600	\$	\$
3.9	Beam Repair	7/SR501	S.F.	170	\$	\$
3.1	Column Repair	8/SR501	S.F.	10	\$	\$
3.11	Wall Repair	9/SR501	S.F.	40	\$	\$
3.12	Knockdown Loose Concrete at Ceiling	-	L.S.	1	\$	\$
Division 4						
4.1	CMU Wall Repair	04 0100	S.F.	80	\$	\$
4.2	CMU Block Parge	13/SR501	S.F.	30	\$	\$
4.3	Remove Brick at Steel Beam	14/SR501	L.F.	60	\$	\$
4.4	Brick Repair at Parapet Wall	04 0100	S.F.	90	\$	\$



4.5	Re-Point Deteriorated Mortar Joints	12/SR501	L.F.	1,500	\$	\$
Division 5						
5.1	Install Steel Pipe Bollard	11/SR501	EA.	6	\$	\$
5.2	Install Guardrail	15/SR501	L.F.	20	\$	\$
Division 7						
7.1	Rout & Seal Cracks	3/SR511	L.F.	1,500	\$	\$
7.2	Remove & Replace Control Joint Sealant	1/SR511	L.F.	300	\$	\$
7.3	Remove & Replace Cove Sealant	2/SR511	L.F.	2,000	\$	\$
7.4	Remove & Replace Capstone Sealant	13/SR511	L.F.	250	\$	\$
7.5	Epoxy Deck Coating Repair	11/SR511	S.F.	10	\$	\$
7.6	Install Epoxy Deck Coating	07 1800	S.F.	8,600	\$	\$
Division 9						
9.1	Install Spray Applied Fireproofing at Steel Beams	07 8100	L.F.	80	\$	\$
Division 22						
22.1	Remove & Replace Floor Drain	16/SR501	EA.	9	\$	\$
22.2	Remove Drain & Cap Piping	22 1400	EA.	12	\$	\$
22.3	Clean Out Floor Drain & Risers to SOG	-	EA.	9	\$	\$
Division 32						
32.1	Paint Pavement Markings	32 1723	L.S.	1	\$	\$

*Unit Key Code: L.S. - Lump Sum, S.F. - Square Foot, L.F. - Lineal Foot, EA. - Each, Allow. = Allowance

Allowance:

Capstone Repair at Parapet Wall allowance and material to be added in the following amount as per Specification Section 012100. The allowance expenditure must be accounted for and approved **in advance** by WSU and the architect during the construction phase of the project:

\$ 2,000.00 Dollars



TOTAL BASE PROPOSAL WITH ALLOWANCE:

\$

Dollars

LAWN REPLACEMENT:

The undersigned agrees that, in the event of existing lawn or landscaping damage, due to the Contractor's work, that has not been properly addressed and repaired to the satisfaction of the University, the University may repair/replace the lawn and/or landscaping, and that the expense will be at a **unit cost of \$10.00 per square yard for lawn, and landscaping at a rate of 1.5 times the cost of said repairs**, the full cost of which shall be reimbursed by the contractor.

**CONTRACT CHANGE
ORDERS: (revised 4-17-2017)**

The undersigned agrees to the following pricing formula and rates for changes in the contract work:

Where changed Work is performed, the Contractor may add to the total estimated actual cost for such Work no more than ten (10%) for subcontractor mark-up and seven and one-half percent (7.5%) for self-performed trade work for profit, overhead, insurance, taxes, indirect supervision, bonds, and any other costs not allowed by section 4.02.01

Within 14 days of the project's contract execution Contractor shall provide to the Owner; Subcontractor's hourly labor rate breakdown details. This requirement shall extend to the lowest level of subcontractor participation.

* Job and general overhead includes supervision and executive expenses; use charges on small tools, scaffolding, blocking, shores, appliances, etc., and other miscellaneous job expenses.

** Net labor cost is the sum of the base wages, fringe benefits established by governing trade organizations, applicable payroll taxes, and increased expense for contractor's liability insurance (Workman's Compensation, P.L. and P.D.).

TIME OF COMPLETION:

(revised 4-01-2011)

The Contract is expected to be fully executed on or about 25 calendar days after successful bidder qualification and recommendation of award. The undersigned agrees to start construction **immediately after** receipt of a fully executed contract, and to complete the work as follows:

Substantial Completion will be completed no later than **November 23, 2018**.

LIQUIDATED DAMAGES:

It is understood and agreed that, if project is not completed within the time specified in the contract plus any extension of time allowed pursuant thereto, the actual damages sustained by the Owner because of any such delay, will be uncertain and difficult to ascertain, and it is agreed that the reasonable foreseeable value of the use of said project by Owner would be the sum of **\$500.00, Five Hundred Dollars per day**, and therefore the contractor shall pay as liquidated damages to the Owner the sum of **\$500.00, Five Hundred Dollars per day** for each day's delay in substantially completing said project beyond the time specified in the Contract and any extensions of time allowed thereunder.

TAXES:

The undersigned acknowledges that prices stated above include all applicable taxes of whatever character or description. Michigan State Sales Tax is applicable to the work. Bidder understands that the Owner reserves the right to reject any or all bids and to waive informalities or irregularities therein.



ADDENDA:

The undersigned affirms that the cost of all work covered by the following Addenda are included in the lump sum price of this proposal.

Addendum No. _____ Date _____ Addendum No. _____ Date _____

Addendum No. _____ Date _____ Addendum No. _____ Date _____

Addendum No. _____ Date _____ Addendum No. _____ Date _____

Addendum No. _____ Date _____ Addendum No. _____ Date _____

Addendum No. _____ Date _____ Addendum No. _____ Date _____

CONTRACTOR'S PREQUALIFICATION STATEMENT & QUESTIONNAIRE:

Our Minimum Requirements for Construction Bids are:

WSU considers this project: **Roofing & Cement Work.**

Criteria	Small Project bid less than \$50,000	Medium Project bid between \$50,001 and \$250,000	Large Project bid between \$250,001 and \$2 million	Very Large Project bid greater than \$2 million
EMR Rating (Experience Modification Rating)	1.0 or Less	1.0 or Less	1.0 or Less	1.0 or Less
Bondable Vendor	N.A.	Required	Required	Required
Length of Time in Construction Business	2 Years	3 Years	5 Years	5 Years
Demonstrated Experience in Projects Similar in Scope and Price in the last 3 years	1 or more	1 or more	2 or more	3 or more
Unsuccessful Projects on Campus in last 3 years	None Allowed	None Allowed	None Allowed	None Allowed
Failure to comply with Prevailing Wage and/or Project Labor requirements	None Allowed	None Allowed	None Allowed	None Allowed
Withdrawn University Bid (with or without Bond forfeiture) within the last 3 years **	1 or less	1 or less	1 or less	1 or less
Company currently not in Chapter 11 of the US Bankruptcy Code	1 Year	2 Years	3 Years	3 Years

** Withdrawal of a bid is subject to the University suspension policy, for a period up to one year.

Contractors must complete the following information to determine their eligibility to participate in this bid. This information is required with your Bid to the University

Failure to complete this form in its entirety will result in your bid being disqualified.

Check one of the following on the makeup of your company:



_____ Corporation

_____ Individual

_____ Partnership

_____ Joint Venture

_____ Other (Explain below):

Diversity Classification: Please indicate the appropriate diversity classification for your company. The University recognizes the following groups as diverse or disadvantaged:

- Majority Owned _____
- Minority Business Enterprises (MBE) _____
- Women Business Enterprises (WBE) _____
- Disabled Veteran Enterprises (DVBE) _____
- Disabled Person Enterprises (DBE) _____
- Veteran Owned Businesses (VBE) _____
- Small Businesses per the US Small Business Administration (SBE) _____
- Other (Please Explain): _____

1. How many years has your organization been in business as a contractor? _____

2. How many years has your organization been in business under its present business name? _____

3. List states in which your organization is legally qualified to do business. _____

4. Provide the Name and Address of your Liability Insurance Carrier. _____

5. What is your current EMR Rating? _____

The minimum requirement is an EMR Rating of 1.0 or less for all projects. Bidders with a rating higher than 1.0 understand that their bid may be disqualified, at the sole discretion of the University.

6. What percentage of work performed on projects are by company employees; excluding any hired subcontracting and outsourced relationships, for the bid submitted? _____ %

7. What percentage of work performed on your companies behalf are by subcontracted business relationships; disallowing 1099 contracting work forces, for the bid submitted? _____ %

8. Have you ever failed to complete any work awarded to you? If so, attach a separate sheet of explanation. Include the name of the Project, the customer, the dates of the work, and the amount of the contract?

9. Have you withdrawn a bid after a University bid opening and/or refused to enter into a contract with the University upon notification of award within the last 3 years? If so, state the Project Name and Number, and the date of bid submission below.

10. Has any officer or partner of your organization ever been an officer or partner of another organization that failed to complete a construction contract? If so, attach a separate sheet of explanation.

11. List the construction experience of the principals and superintendents of your company.



Name: _____ Title: _____

Name: _____ Title: _____

Name: _____ Title: _____

12. List the construction Projects, and approximate dates, when you performed work similar in Scope to this project.

Project: _____ Owner: _____

Contract Amount: _____ Date Completed: _____

Project: _____ Owner: _____

Contract Amount: _____ Date Completed: _____

Project: _____ Owner: _____

Contract Amount: _____ Date Completed: _____

13. List the construction Projects, and approximate dates, when you performed work similar in Dollar Amount to this project.

Project: _____ Owner: _____

Contract Amount: _____ Date Completed: _____

Project: _____ Owner: _____

Contract Amount: _____ Date Completed: _____

Project: _____ Owner: _____

Contract Amount: _____ Date Completed: _____

14. Is your Company "bondable"? Yes _____ No _____

15. What is your present bonding capacity? \$ _____

16. Who is your bonding agent?

NAME: _____

ADDRESS: _____



PHONE: ()

CONTACT: _____

17. Does your company agree to provide financial reports to the University upon request? Failure to agree may result in disqualification of your bid. Yes _____ No _____
18. Does your company agree that all of the Terms and Conditions of this RFP and Vendor's Response Proposal become part of any ensuing agreement? Yes _____ No _____
19. Does your company agree to execute a contract containing the clauses shown in Section 00500 "Agreement Between Contractor and Owner for Construction"? Yes _____ No _____

If "No", clearly note any exceptions to any information contained in the contract documents and include with your proposal.

20. Did your company quote based upon **Prevailing Wage Rates**? Yes _____ No _____
21. Does your company agree to comply with the University **Smoke and Tobacco Free Policies**? Yes _____ No _____

Note: Contractors submitting proposals for this project may, at the discretion of the University, be required to submit references including contact information to be used to assist in the post bid evaluation process for the subject project

**ACKNOWLEDGEMENT OF
MINIMUM QUALIFICATIONS:**

The undersigned has read and understands the minimum qualifications for University construction projects, and has completed the Prequalification section completely and accurately. The undersigned understands that a contractor, who fails to meet the minimum qualifications **in the category identified for this project, will be disqualified from consideration for the project.**

ACCEPTANCE OF PROPOSAL:

The undersigned agrees to execute a Contract, being the Wayne State University standard form titled "Agreement Between Contractor and Owner for Construction" (see section 00500 of the bid documents), provided that we are notified of the acceptance of our Proposal within sixty (60) days of the date set for the opening thereof.

The undersigned below understands that the bid will be disqualified if the Prequalification information above is not completed in its entirety.

NAME OF COMPANY: _____

OFFICE ADDRESS: _____

PHONE NUMBER: _____ DATE _____

FAX NUMBER: _____

SIGNED BY: _____

Signature

(Please print or type name here)

TITLE _____

EMAIL ADDRESS: _____ @ _____



WAYNE STATE
UNIVERSITY

USB Roof & Structure Repairs
WSU Project No. 060-313960

PREVAILING WAGE RATE SCHEDULE (revised 4-05-2010)

- A. See also Page 00100-4 Section 12.B
- B. Wayne State University requires all project contractors, including subcontractors, who provide labor on University projects to compensate at a rate no less than prevailing wage rates.
- C. The rates of wages and fringe benefits to be paid to each class of laborers and mechanics by each VENDOR and subcontractor(s) (if any) shall be not less than the wage and fringe benefit rates prevailing in Wayne County, Michigan, as determined by the United States Secretary of Labor. Individually contracted labor commonly referred to as "1099 Workers" and subcontractors using 1099 workers are not acceptable for work related to this project.
- D. Certified Payroll must be provided for each of the contractor's or subcontractor's payroll periods for work performed on this project. Certified Payroll should accompany all Pay Applications. Failure to provide certified payroll will constitute breach of contract, and pay applications will be returned unpaid, and remain so until satisfactory supporting documents are provided.

A Prevailing Wage Rate Schedule is enclosed as Appendix A.

Additional information can be found on the University Procurement & Strategic Sourcing's web site at the following URL address:

<http://procurement.wayne.edu/vendors/wage-rates.php>

E. Wayne State University's Prevailing Wage Requirements:

When compensation will be paid under prevailing wage requirements, the University shall require the following:

- A. The contractor shall obtain and keep posted on the work site, in a conspicuous place, a copy of all current prevailing wage and fringe benefit rates.
- B. The contractor shall obtain and keep an accurate record showing the name and occupation of and the actual wages and benefits paid to each laborer and mechanic employed in connection with this contract.
- C. The contractor shall submit a completed certified payroll document [U.S. Department of Labor Form WH 347] verifying and confirming the prevailing wage and benefits rates for all employees and subcontractors for each payroll period for work performed on this project. The contractor shall include copies of pay stubs for all employee or contract labor payments related to Wayne State University work. The certified payroll form can be downloaded from the Department of Labor website at <http://www.dol.gov/whd/forms/wh347.pdf>.
- D. A properly executed sworn statement is required from all tiers of contractors, sub-contractors and suppliers which provide services or product of \$1,000.00 or greater. Sworn statements must accompany applications for payment. All listed parties on a sworn statement and as a subcontractor must submit Partial or Full Conditional Waivers for the amounts invoiced on the payment application. A copy of the acceptable WSU Sworn Statement and Waiver will be provided to the awarded contractor.
- E. Apprentices for a skilled trade must provide proof of participation in a Certified Apprenticeship Program and the level of hours completed in the program.
- F. Daily project sign-in sheets and field reports for the project must be turned in weekly.

Note: Contractor invoices WILL NOT be processed until all listed certified payroll documents are received.

- G. If the VENDOR or subcontractor fails to pay the prevailing rates of wages and fringe benefits and does not cure such failure within 10 days after notice to do so by the UNIVERSITY, the UNIVERSITY shall have the right, at its option, to do any or all of the following:



1. Withhold all or any portion of payments due the VENDOR as may be considered necessary by the UNIVERSITY to pay laborers and mechanics the difference between the rates of wages and fringe benefits required by this contract and the actual wages and fringe benefits paid.
2. Terminate this contract and proceed to complete the contract by separate agreement with another vendor or otherwise, in which case the VENDOR and its sureties shall be liable to the UNIVERSITY for any excess costs incurred by the UNIVERSITY.
3. Propose to the Director of Purchasing that the Vendor be considered for Debarment in accordance with the University's Debarment Policy, found on our website at <http://procurement.wayne.edu/docs/appm28.pdf>

Terms identical or substantially similar to this section of this RFP shall be included in any contract or subcontract pertaining to this project.

- H. Prior to award of the project, the apparent low bidder will be required to produce a schedule of values which will include the proposed subcontractors for each division of work and whether the subcontractor is signatory or non-signatory. A letter of intent or **contract will not** be issued to the apparent low bidder until this document is provided. The apparent low bidder will have one week to produce this document. If the required document is not received within this time, the bidder will be disqualified, and the next low bidder will be required to provide this schedule of values.

APPENDIX A FOR THE PREVAILING WAGE SCHEDULE FOR THIS PROJECT

See web site:
<http://go.wayne.edu/bids>



**APPENDIX A FOR THE
PREVAILING WAGE SCHEDULE FOR THIS PROJECT**

See web site:

<http://go.wayne.edu/bids>



Key Performance Indicator Tracking Sworn Statement Requirements

The University tracks its level of spend along a number of socio-economic categories. This includes its spend with Diverse organizations, its spend with Detroit based organizations, and its spend with Michigan based organizations. To assist with this, The University has the following requirements for submission of your bid and for Pay Applications submitted by the successful contractor.

Submission of Bid

1. **Diverse or disadvantaged prime contractor:** Please specify in your bid whether ownership of your company is a certified diverse or disadvantaged business, according to the categories listed previously in section 00300. In accordance with guidelines from the MMSDC and GL-WBC, the University considers a business to be diverse when it is at least 51% owned, operated, and controlled by one or more members of a diverse classification. Section 00300 has a place for this information on page 00300-3.
2. **Detroit based and Michigan Based contractor:** It is presumed that the contractor is headquartered at the location we submit our Purchase Orders to, and that it should be the same address as listed in Section 00300 at the signature line. If a supplier is headquartered elsewhere, please make note of this information, so we do not inaccurately include or exclude spend.

Pay Applications and Sworn Statements

1. **Applicability:** The University requires Sworn Statements with Pay Applications for all construction projects that use
 - Subcontractors greater than \$1,000.00
 - Significant suppliers (those with a purchase value of \$1,000 or more).
2. **Sworn Statements:** The Supplier must submit applicable monthly sworn statements to the Project Manager and the Buyer of Record, in the format shown on page 2 of Section 00420. Sworn Statements are "always required" for this project, and are to be submitted to (**Project Manager**), the project manager, and to **Valerie Kreher, Senior Buyer**
3. **Inclusion:** Sworn Statements are to detail the inclusion of recognized diverse and disadvantaged groups in the following 2 categories; Subcontracts or Suppliers. The University recognizes the following groups as diverse or disadvantaged:
 1.
 - Minority Business Enterprises (MBE)
 - Women Business Enterprises (WBE)
 - Disabled Veteran Enterprises (DVBE)
 - Disabled Person Enterprises (DBE)
 - Veteran Owned Businesses (VBE)
 - Small Businesses per the US Small Business Administration (SBE)
4. A complete set of the University's Supplier Diversity Program, which includes complete definitions of each of the above, can be downloaded from our web site at <http://policies.wayne.edu/administrative/04-02-supplier-diversity.php>.



WAYNE STATE UNIVERSITY

USB Roof & Structure Repairs WSU Project No. 060-313960

STATE OF MICHIGAN						Sworn Statement				
COUNTY OF _____ } §										
_____, being duly sworn, deposes and says that (s)he makes the Sworn Statement on behalf of _____, who is the Contractor for an improvement to the following described real property situated in _____ County, Michigan, and described as follows:										
That the following is a statement of each subcontractor and supplier and laborer, for which laborer the payment of wages or fringe benefits and withholdings is due but unpaid, with whom _____ has subcontracted for performance under the contract with the Owner or lessee thereof, and that the amounts due to the persons as of the date thereof are correctly and fully set forth opposite their names, as follows. (Subcontracts or suppliers of values of less than \$1,000 are omitted.)										
NO.	SUBCONTRACTOR (Name, Address, Telephone Number) SUPPLIER OR LABORER	S=Supplier C=Contractor	Type of Entity *see below	TYPE OF IMPROVEMENT FURNISHED	TOTAL CONTRACT PRICE	CONTRACT CHANGE +/-	ADJUSTED CONTRACT AMOUNT	AMOUNT PAID TO DATE	AMOUNT CURRENTLY OWING	BALANCE TO COMPLETE
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
TOTALS										
* Type of Entity: MBE=Minority Business Enterprises; WBE=Women Business Enterprises; DVBE=Disabled Veteran Enterprises; DBE=Disabled Person Enterprises; VBE=Veteran Owned Businesses; SBE=Small Businesses per the US Small Business Administration										
Please attach additional sheets if the number of items exceeds the page limit.										



That _____ has not procured material from, or subcontracted with, any person other than those set forth above and owes no money for the improvement.											
Deponent further says that _____ makes the foregoing statement as a representative of _____, for the purpose of representing to the owner or lessee of the above-described premises and his or her agents that the above-described property is free from claims of construction liens, or the possibility of construction liens, except as specifically set forth above and except for claims of construction liens by laborers which may be provided pursuant to section 109 of the construction lien act, Act No. 497 of the Public Acts of 1980, as amended, being section 570.1109 of the Michigan Compiled Laws.											
											Deponent Signature
WARNING TO OWNER: AN OWNER OR LESSEE OF THE ABOVE-DESCRIBED PROPERTY MAY NOT RELY ON THIS SWORN STATEMENT TO AVOID THE CLAIM OF A SUBCONTRACTOR, SUPPLIER, OR LABORER WHO HAS PROVIDED A NOTICE OF FURNISHING OR A LABORER WHO MAY PROVIDE A NOTICE OF FURNISHING PURSUANT TO SECTION 109 OF THE CONSTRUCTION LIEN ACT TO THE DESIGNEE IS NOT NAMED OR HAS DIED.											
ON RECEIPT OF THIS SWORN STATEMENT, THE OWNER OF LESSEE, OR THE OWNER'S OR LESSEE'S DESIGNEE, MUST GIVE NOTICE OF ITS RECEIPT, EITHER IN WRITING, BY TELEPHONE, OR PERSONALLY, TO EACH SUBCONTRACTOR, SUPPLIER AND LABORER WHO HAS PROVIDED A NOTICE OF FURNISHING UNDER SECTION 109 OR, IF A NOTICE OF FURNISHING IS EXCUSED UNDER SECTION 108 OR 108A, TO EACH SUBCONTRACTOR, SUPPLIER OR LABORER WHO HAS PROVIDED A NOTICE OF FURNISHING OR WHO IS NAMED IN THE SWORN STATEMENT MAKES A REQUEST, THE OWNER, LESSEE, OR DESIGNEE SHALL PROVIDE THE REQUESTER A COPY OF THE SWORN STATEMENT WITHIN 10 BUSINESS DAYS AFTER RECEIVING THE REQUEST.											
WARNING TO DEPONENT: A PERSON, WHO WITH INTENT TO DEFRAUD, GIVES A FALSE STATEMENT IS SUBJECT TO CRIMINAL PENALTIES AS PROVIDED IN SECTION 110 OF THE CONSTRUCTION LIEN, ACT, ACT NO. 497 OF THE PUBLIC ACTS OF 1980, AS AMENDED, BEING SECTION 570.2220 IF THE MICHIGAN COMPILED LAWS.											
Subscribed and sworn to before me this _____ day of _____											(NOTARY STAMP BELOW)
Notary Public _____											
_____ County, Michigan - My commission expires: _____											
Rev. 4_06.05.15											



WAYNE STATE UNIVERSITY
PAYMENT PACKAGE DOCUMENT REQUIREMENTS (Revised 7-23-2015):

Review and comply with Section 410 of Bid Front End Documents.
Review and comply with Article 15 of the Supplemental General Conditions.

PAYMENT APPLICATION - AIA document G702 & G703 (or equivalent) –Checklist:

- Correct Project Name – Found on your contract.
- Correct Project Number – Found on your contract.
- Purchase Order Number – Required prior to beginning work.
- Correct Application Number.
- Correct Period Reporting Dates – Applications support docs must be sequential and within application range.
- Approved & Executed Change Orders Listed. (Cannot invoice for unapproved Change Orders)
- Schedule of Values percentages and amounts match the approved Pencil Copy Review – Signed by the Architect, Contractor, and University Project Manager.
- Correct Dates – Back dating not accepted.
- Signed and Notarized.

SWORN STATEMENT – Checklist:

- List all contractors, sub-contractors, suppliers... ≥ \$1000.00
- A sworn statement is required from every Sub Contractor on the job with a material purchase or sub-contract of \$1,000 or more. (All tiers.)
- Purchase Order Number
- Dates – Back dating not accepted.
- Signed and Notarized.

CERTIFIED PAYROLL - Dept. of Labor Form WH-347 – Checklist: (Union and Non-Union)

- For every contractor & sub-contractors work, for each week within the application reporting period.
- Correct Project Number
- List ALL workers on-site.
- Make sure their addresses are listed.
- Social Security Numbers MUST be blackened out or listed in XXX-XX-1234 format.
- Work classifications based on the job specific Prevailing Wage Schedule descriptions.
- For any workers paid at the Apprenticeship rates - proof of enrolled program and current completion required.
- Rate of Pay verified against the Prevailing Wage Schedule with an hourly cost breakdown of fringes paid.
- Authorized signatures on affidavit.
- Dates – must represent the weeks within the application period.

APPLICATION PACKAGE SUPPORTING DOCUMENTATION –

- Copies of **Pay Stubs** for each Certified Payroll period reported may be required– (Social Security Numbers MUST be blackened out or listed in XXX-XX-1234 format. Pay stubs need to reflect claimed participation of fringes like Medical, Dental, Retirement or 1099 classification.)
- **Proof of Ownership** for any 'Owner Operator' contractors not wishing to claim their time on prevailing wage. – (Must list their hours and dates worked on the WH-347 Form and enter EXEMPT on the income



brackets.) The Owner must provide copies of "DBA" registration form confirming status as exempt from prevailing wage requirements.

- **Proof of Stored Materials** – Bill of Lading, Delivery Receipts, Pictures, Certificate of Insurance or endorsement page specifically insuring stored material at location, and pictures with materials clearly separated and labeled for WSU. The University reserves the right to on site verification of stored materials.
- **Partial Conditional Waivers** – The contractor shall provide covering the entire amount of the application. For non-bonded projects all sub-contractors must provide for all applications which they have a draw.
- **Partial Unconditional Waivers** – Must release amount paid for work and be delivered starting with application #2 and in no case after payment application #3, through all sequential applications for contractors, sub-contractors, and suppliers listed on the Sworn Statements.
- **Full Unconditional Waivers** – Must be delivered with final payment application, releasing all contractors, sub-contractors, suppliers listed on the sworn statements and any legitimate notice of furnishings reconciled.

FINAL PAYMENT APPLICATION – Checklist:

- Clear and concise As-Built drawings.
- Operation and Maintenance Manuals
- Process and training directions (if applicable).
- Warranty of work in accordance with project documents.
- Submittals log and samples installed on the job.
- Certificate of Substantial Completion
- Full Unconditional Waiver

○

The Project Manager may provide additional requirements as may apply to individual jobs

Revised 7-23-2015



Contractor Performance Evaluation

In an effort to provide continuous process improvement regarding the construction of various university projects, Wayne State University is embarking upon a process of evaluating the contractor's overall performance following the completion of work. At the conclusion of the construction project a subjective evaluation of the Contractor's performance will be prepared by the Project Manager and the supervising Director of Construction. The evaluation instrument that will be used in this process is presented below:



Contractor Evaluation Sheet

Contractor Name : _____	Project Name: _____
Contractor's PM: _____	PM Name: _____
Superintendent: _____	Project Number: _____ PO#: _____
Designer: _____	

EVALUATION SCORING: 1 = Unacceptable, 2 = Less than Satisfactory, 3 = Satisfactory or Neutral, 4 = Good, 5 = Excellent

Note: Comments are REQUIRED if any score is less than 3. Write comments on the back of the evaluation.

Field Management

	Score					Weight	Total
1) Work Planning / Schedule:	1	2	3	4	5	8	
2) Compliance with Construction Documents:	1	2	3	4	5	8	
3) Safety Plan & Compliance:	1	2	3	4	5	5	
4) Compliance with WSU procedures:	1	2	3	4	5	7	
5) Effectiveness of Project Supervision:	1	2	3	4	5	8	
6) Project Cleanliness:	1	2	3	4	5	3	
7) Punch List Performance:	1	2	3	4	5	5	
8) Contractor Coordination with WSU Vendors:	1	2	3	4	5	3	
9) Construction Quality:	1	2	3	4	5	8	

Administrative Management

10) Responsiveness:	1	2	3	4	5	4	
11) Contractor communication:	1	2	3	4	5	4	
12) Contractor Professionalism:	1	2	3	4	5	3	
13) Subcontractor Professionalism:	1	2	3	4	5	3	
14) Compliance with Contract Requirements:	1	2	3	4	5	3	
15) Submittal\RFI Process:	1	2	3	4	5	4	
16) Close-out - Accuracy of Documents	1	2	3	4	5	7	

Invoice and Change Management

17) Change Management	1	2	3	4	5	7	
18) Applications for Payment	1	2	3	4	5	6	
19) Timely payment of Subs/Suppliers:	1	2	3	4	5	4	
						Total 100	Total

20) Level of Self-Performance:	Low	Med	High
21) Would you work with this Contractor again?		Yes	No
22) Would you work with this team again?		Yes	No

One year follow up

23) Warranty Support:	1	2	3	4	5
-----------------------	---	---	---	---	---

Evaluator

Signature _____	Date: _____
Title: _____	
Name: _____	

Please Print

Rev. 2-17-2015 RGP



We are providing the evaluation instrument at this time to allow the bidder's to review and understand the criterion that the University's project management team will use to evaluate the successful bidder's performance at the conclusion of the project. It is the intent of the university to utilize the results of this evaluation to determine if it will continue to conduct business with the Contractor in future bidding opportunities.

The scoring range is between 100 to 500 points, with 100 being low and 500 being high. Each question has an associated 'weight' factor, and the higher the weight; the greater the importance of satisfactory performance on the final score. At the conclusion of the project, and after the Project Manager and the supervising Director has prepared their independent evaluation, the University's project representative will meet with the Contractor to review the results. Acceptable contractor performance is essential to avoid having the University decline future work with the Contractor. An appeals process is available for Contractor disagreement with evaluation scores.

Contractors engaged in work are encouraged to maintain an open and regular dialog with the Design and Construction Department over the course of the construction project to ensure that the final evaluation is an accurate representation of the Contractor's performance.



CONSOLIDATED AGREEMENT FOR CONSTRUCTION GENERAL CONTRACTING

BOARD OF GOVERNORS OF WAYNE STATE UNIVERSITY
DETROIT, MICHIGAN

With

[GENERAL CONTRACTOR'S NAME]

For

[NAME PROJECT]

Wayne State University Contract Number [REDACTED]

This Agreement is entered into on [REDACTED], 20[REDACTED], by and between the Board of Governors of Wayne State University, called "University" in this Agreement, and [CONTRACTOR NAME], called "Contractor" in this Agreement, to provide construction labor and materials as outlined in the Bid accepted [ENTER DATE HERE], attached to this Agreement as Exhibit A, for the Project described in this Agreement.

[ENTER A BRIEF DESCRIPTION OF THE PROJECT]



1.00 CONTRACT DOCUMENTS

The Contract Documents shall consist of this Agreement, the Contractor's Bid or Proposal attached to this Agreement as Exhibit A only insofar as consistent with the other Contract Documents, the General Conditions of Construction, the Supplementary General Conditions, the approved plans and specifications, and other documents listed in Article 11, Inclusion by Reference. In the case of conflicts between the Contractor's Bid and this Agreement or other Contract Documents, the language of this Agreement and the other Contract Documents shall prevail over the Contractor's Bid or Proposal.

2.00 DESIGN PROFESSIONAL

The Design Professional for this Project is:

[NAME]
[ADDRESS]

The University intends that the relationship between the Contractor, Design Professional and University will be one of mutual cooperation and respect in order to promote efficiency and quality in the Project work.

3.00 CONTRACTOR'S RESPONSIBILITIES

3.01 Scope of Work

The Contractor shall furnish all labor, materials, equipment, project management and construction superintendent services necessary to construct the Work in accordance with the approved Contract Documents and executed Change Orders, including requirements reasonably inferable therefrom.

3.02 Skill and Judgment

The Contractor covenants with the University to furnish its best skill and judgment in furthering the interests of the University as defined in the Contract Documents. The Contractor shall perform all obligations under the Contract Documents using efficient business administration, superintendence and best efforts to facilitate the expeditious and timely completion of the Project consistent with the interests of the University as expressed in the Contract Documents. The Contractor acknowledges that significant effort will be invested in complying with the Contractor's Construction Schedule, and in maintaining construction quality. Accordingly, the Contractor further acknowledges that the greatest degree of professionalism is expected from the Contractor and the Design Professional in accomplishing their respective contractual obligations and that when potential conflicts exists, each shall demonstrate appropriate respect, professionalism and cooperation with each other in resolving such conflicts.

3.03 Scheduling

The Contractor shall develop a Contractor's Construction Schedule that clearly indicates the interrelationship of activities and defines the critical path of the entire Project. The Contractor shall submit a preliminary Contractor's Construction Schedule, by the earlier of fifteen (15) days from either the Notice to Proceed or the execution of this Agreement. The Contractor shall provide iterative updates to the Contractor's Construction Schedule with each Application for Payment, but no less than monthly. Upon request by the University, the Contractor shall prepare and submit a resource-loaded Contractor's Construction Schedule to the University and Design Professional for approval.

3.04 Construction

3.04.1 Subcontracts and Purchase Agreements

The Subcontracts shall be solely between the Contractor and the Subcontractors. Nothing in any Subcontract shall establish any contractual relationship between the University and any Subcontractor. However, the University is an intended third-party beneficiary of all Subcontracts, purchase orders and other agreements; the Contractor shall incorporate the obligations of the Contract Documents into its respective Subcontracts, supply agreements and purchase orders.

The Contractor will screen and pre-qualify, utilizing appropriate industry standards, potential Subcontractors for the Work keeping in mind the requirement to recruit and encourage Minority/Women Business Enterprise participation. The University shall have the right to review and approve all Subcontractors qualified or rejected for qualification by the Contractor. The Contractor shall notify the University of all Subcontractors to be used, and the Contractor shall remove any Subcontractor to which the University has an objection.

The Contractor shall obtain appropriate guarantees and warranties acceptable to the University from the Subcontractors, which shall be for the direct benefit of the University.

3.04.2 Construction Supervision

- a) The Contractor shall establish sufficient on-site organization, staffing and support as well as clear lines of authority in order to expeditiously complete the Project in accordance with the Contract Documents, in every aspect, on a totally coordinated basis.
- b) The Contractor shall maintain a competent full-time staff available at the site while Work is being performed to supervise, schedule and coordinate the performance of the Work of all Subcontractors in accordance with the University's objectives including cost, time for completion and quality of the Work. Contractor's Staffing Plan is attached as Exhibit D to this Agreement. The Staffing Plan shall not be changed, except with the written consent of the University's Representative unless members of the Project Staff cease to be in the employ of the Contractor.
- c) The Contractor shall notify the University of the dates, times and locations of conferences with Subcontractors and schedule and conduct regular progress meetings to be attended by all parties in interest including the University to discuss such matters as procedures, progress, job problems, scheduling, coordination, changes, and related matters.
- d) The Contractor shall take, transcribe and promptly distribute to all parties, including the University, minutes of such progress meetings with the Subcontractors, weekly job meetings and monthly management meetings.
- e) The Contractor shall maintain an on-site daily log of construction progress, problems and items of special interest. The Contractor shall provide digital photographic files and digital recording showing Project status or progress. Such logs, records, photographs and videos shall be immediately available to the University upon request.
- f) The Contractor shall furnish monthly written progress reports on the Subcontractors' work in a form acceptable to the University and assist the Design Professional and the University with periodic and final inspections of the Work. At all inspections preceding the final inspection, the Contractor shall furnish a detailed report to the University of observed discrepancies, deficiencies, and omissions in the Work performed by any Subcontractor.
- g) The Contractor shall provide and maintain a correct layout of the structures and monitor the Work to verify that all lines and levels are adhered to by the Subcontractors. The Contractor shall immediately report in writing all discrepancies with respect to design details for prompt resolution by the Design Professional.



- h) The Contractor shall submit any Request for Information (RFI) to the Design Professional and University only after attempting to determine if the requested clarification is contained in the Contract Documents; any RFI shall contain sufficient detail to allow a response within seven (7) calendar days of when the RFI is submitted. In no event shall the response to an RFI be considered delayed unless more than fourteen days have passed since the RFI was submitted.
- i) 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 Documents or that which is reasonably inferable for the completion of the Project.
- j) The Contractor shall be responsible to the University for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons performing any portion of the Work related to a contract with the Contractor.
- k) The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities of the University, Design Professional, or by tests, inspections or approvals required or performed by persons other than the Contractor, except where such relief is authorized by the University in writing in accordance with this Agreement.
- l) The Contractor shall inspect portions of Work performed or portions of existing facilities being renovated in this Project to determine that such portions are in proper condition to receive subsequent Work. Further, the Contractor shall plan for and call for the review of the Work by the University's commissioning agents as required. The Contractor's Construction Schedule shall include activities that recognize this coordination responsibility.

3.04.2.1 Safety

The Contractor shall protect adjoining property and nearby buildings, roads, and other facilities and improvements from dust, dirt, debris and other nuisances arising out of Contractor's operations or storing practices. Dust shall be controlled by sprinkling, negative pressure exhausting or other effective methods acceptable to University. Fugitive dust from interior demolition shall be controlled by negative pressure exhausting. An erosion and sedimentation control program shall be initiated, which includes measures addressing erosion caused by wind and water and sediment in runoff from site. A regular watering program shall be initiated to adequately control the amount of fugitive dust.

The Contractor is knowledgeable of and understands that the University may intend to maintain occupancy of certain portions of the existing facility. The Contractor shall exercise precaution at all times for the protection of persons and their property. The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to: (1) employees on the Work and other persons who may be affected thereby; (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. The Contractor shall install adequate safety guards and protective devices for all equipment and machinery, whether used in the Work or permanently installed as part of the Project.

The Contractor shall also provide and adequately maintain all required means of egress, including but not limited to, proper temporary walks, roads, guards, railings, lights, and warning signs. The Contractor shall comply with all applicable laws relating to safety precautions. The Contractor shall establish, maintain and update a Project Specific Safety Program.



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 University and Design Professional.

The Contractor shall require each and every one of its subcontractors and Trade subcontractors to comply with all of the provisions of this section.

The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.

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 the Contract.

3.04.2.2 Hazardous Condition

The University and/or the Design Professional may bring to the attention of the Contractor a possible hazardous situation in the field regarding the safety of personnel on the site. The Contractor shall be responsible for verifying that all local, state, and federal workplace safety guidelines are being observed. In no case shall this right to notify the Contractor absolve the Contractor of its responsibility for monitoring safety conditions. Such notification shall not imply that anyone other than the Contractor has assumed any responsibility for field safety operations.

Explosives shall not be used without first obtaining written permission from the University and then shall be used only with the utmost care and within the limitations set in the written permission and in accordance with prudence and safety standards required by law. Storage of explosives on the Project site or University is prohibited. Powder activated tools are not explosive for purposes of this Article; however, such tools shall only be used in conformance with State safety regulations.

The Contractor shall immediately make a report to the University's Police Department and report in writing to the University's Representative, within eight (8) hours, all accidents whatsoever arising out of, or in connection with, the performance of the Work, whether on or off the Site but on University property, which caused death, personal injury or property damage, giving full details and statements of witnesses. In addition, if death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger. If any claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall report promptly the facts in writing to the University's Representative, giving full details of the claim.

3.04.2.3 University's Right to Stop the Work

If the Contractor fails to correct work which is not in accordance with the requirements of the Contract Documents as required, or persistently fails to carry out work in accordance with the Contract Documents, the University Representative, by written order may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the University to stop the Work shall not give rise to a duty on the part of the University to exercise this right for the benefit of the Contractor or any other person or entity.

It is understood that while the Contractor is fully responsible for the safety of the Work, and for the methods of its execution, if the University deems that the Contractor is failing to provide safe conditions, the University may stop the Work under such conditions. However, this ability shall not create such duty on the University. Under no circumstance shall the Contractor be granted a time extension or Contract Sum increase for conditions resulting by a stop work order.

3.04.2.4 University's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a three (3) day period after receipt of written notice from the University to commence and continue correction of such default or neglect with diligence and promptness, the University may after such three (3) day period, without prejudice to other remedies the University 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 cost of correcting such deficiencies, including deducting compensation for the Design Professional's additional services and expenses made necessary by such default, neglect or failure. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the University.

3.04.3 Document Management

The Contractor shall maintain at the job site, on a current basis, all Project documents including plans, specifications, shop drawings, samples, submittal, purchase orders, Subcontracts, material specifications, and any other related documents, and revisions thereto, which arise out of or relate to the Project, this Agreement or the Work. Prior to final payment, copies of all such records shall be provided to the University.

The Contractor shall be responsible for reviewing, processing and paying applications by Subcontractors for progress and final payment. The University will compensate the Contractor monthly based on the requirements of Article 4.04, Application For Payment.

The Contractor shall prepare and submit to the University every three months a report of the total M/WBE participation in the Project to demonstrate compliance with Paragraph 3.04.6 together with a projection of M/WBE participation through Final Completion.

3.04.3.1 Review of Contract Documents and Field Conditions by Contractor

Execution of the Contract by the Contractor is a representation that the Contractor shall have thoroughly and carefully examined the site of the of Work; investigated any and all conditions which can affect the Work or its cost, including but not limited to, availability of labor, materials, supplies, water, electrical power, roads, access to the site, University episodic and scheduled closures, uncertainties of weather, water tables, the character of equipment and facilities needed to perform the Work, and local conditions under which the Work is to be performed; and further, that the Contractor shall insure that the documents issued for bidding by Trade Contractors reflect the results of this investigation and are adequate to complete the Work. It is the responsibility of the Contractor to be familiar with the materials, equipment, or procedures to be used in the Work, or which in any other way could affect the completion of the Work. Any failure to properly familiarize themselves with the proposed Work shall not relieve the Contractor from the responsibility for completing the Work in accordance with the Contract Documents.

The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Project. 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 to be consistent with the Contract Documents and the highest standard of care. In the case of an inconsistency between, or perceived omission or error in the Drawings, Specifications, or other Contract Documents which is not clarified by addendum or RFI, or should the Contractor be in doubt as to their exact meaning, the Contractor shall notify the Design Professional and the University prior to performing any related Work. The University shall not be responsible for the Contractor's misinterpretations of Drawings and Specifications and/or other Contract Documents.



The Contractor shall have a continuing duty to read, carefully study and compare the Contract Documents and product data with each other and with information furnished by the University, and shall at once report to the Design Professional and the University errors, inconsistencies, ambiguities and omissions before proceeding with the affected Work. The Contractor shall be liable to the University for damage resulting from errors, inconsistencies or omissions in the Contract Documents, relating to constructability if the Contractor recognized or should have recognized such error, inconsistency, ambiguity or omission and failed to report it to the Design Professional and the University. If the Contractor performs any construction activity which involves such error, inconsistency, ambiguity or omission in the Contract Documents relating to constructability, without such notice to the Design Professional and the University, the Contractor shall assume responsibility for such performance and shall bear all costs attributable for correction. If the Contractor submits authorized substitutes that cost in excess of the Contract Sum which cause coordination conflicts, the Contractor shall bear all costs attributable to correction.

The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Documents before commencing activities. Errors, inconsistencies or omissions discovered shall be reported to the Design Professional prior to performing any affected Work.

The Contractor shall perform the Work in accordance with the Contract Documents.

3.04.4 Cash Flow Estimates and Cost Control

At the University's request, the Contractor shall prepare a Cash Flow Estimate indicating the anticipated schedule of payment application amounts within fifteen (15) days after the Contractor's Bid has been accepted. The Cash Flow Estimate shall be revised periodically, at least every three months, unless significant deviations are expected or otherwise more frequently as requested by the University.

The Contractor shall review requests for changes with the University, and with the University's approval, obtain quotations from affected Subcontractors. Bulletins to Subcontractors shall define the scope of the change and require pricing using either lump sum, time and materials or cost of Work for all items of Work, including overhead and profit as may be defined in the Bid and this Agreement and shall include costs related to schedule delays, if applicable. Where both additions and deductions are involved, each should be calculated separately. Contractor shall be responsible for reviewing the pricing submitted by Subcontractors for accuracy, completeness, and reasonableness.

3.04.5 Minority/Women Business Enterprise Participation

The University makes a continuous effort to strongly encourage Minority Business Enterprise (MBE) and Women Business Enterprise (WBE) contractors and supplier to bid on and participate in University contracts. To the fullest extent permitted under federal and Michigan law, you are strongly encouraged to retain the services of WBE and MBE Subcontractors and suppliers of goods and services in connection with performance of this Contract. For purposes of this Contract, MBE is defined as a business entity in which 51% or minority individuals hold more of the voting shares and interest in the enterprise. The minority ownership of the enterprise shall have management and investment control of the company. WBE is defined as a business entity in which 51% or a woman or women hold more of the voting shares and interest in the enterprise. The female ownership of the enterprise shall have management and investment control of the company.

3.04.7 Time of Completion

The Contractor acknowledges that time is of the essence in performing and completing the Work on the Project. Accordingly, the Contractor shall comply with the activity and milestone completion dates as defined in the Contractor's Construction Schedule as mutually agreed by the Contractor, the University and the



Design Professional. The Contractor shall provide, prepare and/or participate in developing schedules, submittals, shop drawings, construction schedules, close out documents, or other activities consistent with the conditions of the Contract Documents and as set forth below:

A. Substantial Completion: [ENTER COMPLETION DATE]

B. Punchlist Completion: [ENTER COMPLETION DATE]

C. Final Completion: [ENTER COMPLETION DATE]

3.04.8 Timely Completion

Contractor acknowledges that the University has scheduled use of the Project immediately following the Dates of Substantial Completion. In scheduling that use, the University may have signed contracts and otherwise made financial commitments relating to the use of the Project no later than the date of Substantial Completion. In the event that the Contractor fails to complete on or before the date for Substantial Completion, the Contractor shall be responsible to reimburse the University for all direct, indirect and administrative costs and expenses incurred in locating, coordinating and securing alternate sites, refunding deposits, and taking any other reasonable action as a consequence of the Contractor's failure to achieve Substantial Completion by the date stated in this Agreement.

The University shall be entitled to retain from the Contractor those damages incurred upon the Contractor's default of Substantial Completion, as provided above.

The Contractor further agrees to complete 100% of all punchlist items, documented on the Substantial Completion certificate, within forty-five (45) days of the date of Substantial Completion. Nothing in this Article 3.04.08 shall be construed as a limitation or waiver on such other rights as the University may have.

3.04.8.1 Substantial Completion

"Substantial Completion" shall mean 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 the University can occupy or utilize the Work for its intended use. Substantial Completion shall only be determined as described in the Contract Documents.

3.04.8.2 Final Completion

"Final Completion" means the completion of all the Work in accordance with the Contract Documents and the acceptance thereof by the University. Completion of the Work includes (1) full performance of all Contract terms; (2) acceptance of the Work by University; (3) resolution of all outstanding Changes of Contract; (4) completion of all "punch-list" items; and (5) delivery of all Close-out Documents.

3.05 Contractor's Insurance

The Contractor shall not commence Work under this Contract until it has obtained all the insurance required by the Contract Documents and such insurance has been approved by the University; likewise, no



subcontractor or subconsultant shall be allowed to commence Work until the insurance required has been obtained. The Contractor shall, at its expense, purchase and maintain in full force and effect such insurance as will protect itself and the University from claims, such as for bodily injury, death, and property damage, which may arise out of or result from the Work required by the Contract Documents, whether such Work is done by the Contractor, by any subcontractor, by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable. The types of such insurance and any additional insurance requirements are specified herein with the amounts and limits set forth in the Supplementary General Conditions.

3.05.1 Policies and Coverage

The following policies and coverages shall be furnished by the Contractor promptly upon request by the University:

(1) Comprehensive or Commercial Form General Liability Insurance covering all Work done by or on behalf of the Contractor and providing insurance for bodily injury, personal injury, property damage, and Contractual liability. Except with respect to bodily injury and property damage included within the products and completed operations hazards, the aggregate limit shall apply separately to work required of the Contractor by these Contract Documents. This insurance shall include the contractual obligations assumed under the Contract Documents and specifically section 4.06.

(2) Business Automobile Liability Insurance on an "Occurrence" form covering owned, hired, leased, and non-owned automobiles used by or on behalf of the Contractor and providing insurance for bodily injury, property damage, and Contractual liability.

(3) Worker's Compensation and Employer's Liability Insurance as required by Federal and Michigan law. The Contractor shall also require all of its Subcontractors to maintain this insurance coverage.

(4) The Umbrella Excess Liability insurance must be consistent with and follow the form of the primary policies, except that Umbrella Excess Liability insurance shall not be required for the Medical Expense Limit.

(5) Builder's Risk Insurance.

(6) Professional Liability Insurance (Errors and Omissions).

3.05.2 Proof of Coverage

Certificates of Insurance, or other evidence of the insurance required by these Contract Documents or requested by the University, shall be submitted by the Contractor to the University. The Certificates of Insurance shall state the scope of coverage and deductible, identify any endorsements to the policies and list the University as an additional named insured. Any deductible shall be the Contractor's liability. The Certificates of Insurance shall provide for no cancellation or modification of coverage without thirty (30) days prior written notice to the University. Acceptance of Certificates of Insurance by the University shall not in any way limit the Contractor's liabilities under the Contract Documents. In the event the Contractor does not comply with these insurance requirements, the University may, at its option, provide insurance coverage to protect the University; the cost of such insurance shall be deducted from the Contract Sum or otherwise paid by the Contractor. Renewal certifications shall be filed in a timely manner for all coverage until the Project is accepted as complete. Upon the University's request, the Contractor shall provide copies of the policies obtained from the insurers.

3.05.3 Subcontractor's Insurance



The Contractor shall either require subcontractors to carry the insurance or the Contractor shall insure the activities of the subcontractors in the amount, types and form of insurance required by the Contract Documents. If the Contractor elects to have its subcontractors purchase individual insurance policies, the Contractor's subcontracts shall include a clause requiring that copies of any insurance policies which provide coverage to the Work shall be furnished to the University. The Contractor shall supply the University with a list of all subcontractors showing whether or not they have individual insurance policies and certifying that those subcontractors without individual insurance policies are insured by the Contractor.

3.05.4 Scope of Insurance Coverage

The Contractor's insurance as required by the Contract Documents (including subcontractors' insurance), by endorsement to the policies and the Certificates of Insurance, shall include the following and may be presented in the form of a rider attached to the Certificates of Insurance:

(1) The Board of Governors of Wayne State University, the University, their officers, employees, representatives and agents including the Design Professional, shall be included as additional named insureds for and relating to the Work to be performed by the Contractor and subcontractors. This shall apply to all claims, costs, injuries, or damages.

(2) A Severability of Interest Clause stating that, "The term 'insured' is hereby used severally and not collectively, but the inclusion herein of more than one insured shall not operate to increase the limits of the insurer's or insurers' liability."

(3) A Cross Liability Clause stating that, "In the event of claims being made under any of the coverages of the policy or policies referred to herein by one or more insured hereunder for which another or other insured hereunder may be liable, then the policy or policies shall cover such insured or insured against whom a claim is made or may be made in the same manner as if separate policies had been issued to each insured hereunder. Nothing contained herein, however, shall operate to increase the insurer's limits of liability as set forth in the insuring agreements."

(4) The Board of Governors of Wayne State University, the University, their officers, employees, representatives and agents, shall not by reason of their inclusion as insured incur liability to the insurance carriers for payment of premiums for such insurance. However, the Board of Governors of Wayne State University may, in their sole discretion after receiving a notice of cancellation for nonpayment, elect to pay the premium due and deduct such payment from any sums due to the Contractor or recover the amount paid from the Contractor if the sums remaining are insufficient.

(5) Coverage provided is primary and is not in excess of or contributing with any insurance or self-insurance maintained by the Board of Governors of Wayne State University, the University, their officers, employees, representatives and agents.

3.05.5 Miscellaneous Insurance Provisions

The form and substance of all insurance policies required to be obtained by the Contractor shall be subject to approval by the University. All such policies shall be issued by companies lawfully authorized to do business in Michigan and be acceptable to the University. All property insurance policies to be obtained by the Contractor shall name the University as loss payee as its interest, from time to time, may appear.

The Contractor shall, by mutual agreement with the University and at the University's cost, furnish any additional insurance as may be required by the University. The Contractor shall provide appropriate endorsements evidencing such additional insurance.



In the event that the scope of Work includes asbestos abatement, the Contractor or subcontractor, as appropriate, shall provide \$1,000,000 asbestos liability insurance.

The University is not required to provide or purchase any additional insurance with respect to this Project or the Work required of the Contractor for the Project.

3.05.6 Loss Adjustment

Any insured loss is to be adjusted with the University and made payable jointly to the University and the Contractor. The Contractor shall cooperate with the University in a determination of the actual cash value or replacement value of any insured loss. Any deductible amount shall be the responsibility of the Contractor to resolve.

3.05.7 Compensation Distribution

The University upon the occurrence of an insured loss shall account for any money so received and shall distribute it in accordance with such agreement as the interested parties may reach. Claim payments received shall be distributed proportionately according to the actual percentages of losses to both. If after such loss no other special agreement is made, replacement of damaged work shall be covered by an appropriate contract change order. Any dispute shall be resolved by the University.

3.05.8 No Waiver of Subrogation

The University does not waive any rights of Subrogation that it may possess on this Project.

3.06 Indemnification

3.06.1

To the fullest extent permitted by law, the Contractor shall hold harmless, defend, and indemnify the Board of Governors of Wayne State University, the University, and officers, employees, representatives and agents of each of them, from and against any and all claims or losses arising out of or are alleged to be resulting from, or relating to (1) the failure of the Contractor to perform its obligations under the Contract or the performance of its obligation in a willful or negligent manner; (2) the inaccuracy of any representation or warranty by the Contractor given in accordance with or contained in the Contract Documents; and (3) any claim of damage or loss by any subcontractor, or supplier, or laborer against the University arising out of any alleged act or omission of the Contractor or any other subcontractor, or anyone directly or indirectly employed by the Contractor or any subcontractor.

3.06.2

To the fullest extent permitted by law, the Contractor shall be liable for and hereby agrees to defend, discharge, fully indemnify and hold the University harmless from and against any and all claims, demands, damages, liability, actions, causes of action, losses, judgments, costs and expenses of every nature (including investigation costs and/or expenses, settlement costs, and attorney fees and expenses incident thereto) sustained by or asserted against the University arising out of, resulting from, or attributable to the performance or nonperformance of any Work and/or obligation covered by the Contract or to be undertaken in connection with the construction of the Project contemplated by the Contract (collectively, "Claim"), including, but not limited to, any Claim for: (a) any personal or bodily injury, illness or disease, including death at any time resulting therefrom of any person, (including, but not limited to, employees of the University, the Contractor, any subcontractor, and any materialman and the general public); (b) any loss, damage or destruction of any property; (c) any loss or damage to the University's operations, arising out of, resulting from, or attributable in



whole or in part to (i) any negligence or other act or omission of the Contractor, and any subcontractor, any materialman and/or any other person or any of the directors, officers, employees or agents of any of them or (ii) any defects in material or equipment furnished hereunder; (d) any payments allegedly owed to subcontractors, sub-subcontractors or materialmen; (e) any acts or omissions relative to conditions of safety and protection of persons on the Project site; and/or (f) any act or omission relative to the Contractor's breach of obligations and regarding non-discrimination as set forth in these General Conditions. The Contractor shall not be liable hereunder to indemnify the University against liability for damages arising out of bodily injury to persons or damage to property caused by or resulting from the sole negligence or willful misconduct of the University, its agents or employees. The Contractor, at its own cost and expense, shall take out and maintain at all times during the effective period of the Contract, contractual liability insurance insuring the performance by the Contractor of its contractual duties and obligations under this Article, which insurance shall name the University as additional insured and shall be in form and amount and from an insurance company satisfactory to the University. The Contractor's duty to fully indemnify the University shall not be limited in any way by the existence of this insurance coverage.

3.06.3

The Contractor shall also be liable for and hereby agrees to pay, reimburse, fully indemnify and hold the University harmless from and against all costs and expenses of every nature (including attorney fees and expenses incident thereto) incurred by the University in collecting the amounts due from the Contractor, or otherwise enforcing its rights, under the indemnifications described in this Article.

3.06.4

In claims against any person or entity indemnified under this Article made by an employee of the Contractor or a Subcontractor, supplier or indirectly employed by any of them, or anyone for whose acts is made liable, the indemnification obligation under this Article shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor, Subcontractor or supplier under workers compensation laws, disability benefit laws, or other laws providing employee benefits.

3.06.5

The indemnification obligations under this Article shall not be limited by any assertion or finding that the person or entity indemnified is liable by reason of a non-delegable duty.

3.06.6

The Contractor shall hold harmless, defend, and indemnify the University from and against losses resulting from any claim of damage made by any separate contractor of the University against the University arising out of any alleged acts or omissions of the Contractor, a subcontractor, anyone directly or indirectly employed by either the Contractor or subcontractor, or anyone for whose acts either the Contractor or subcontractor may be liable.

3.06.7

The Contractor shall hold harmless, defend, and indemnify the separate Contractors of the University from and against losses arising out of the negligent acts or omissions or willful misconduct of the Contractor, a subcontractor, anyone directly or indirectly employed by the Contractor or subcontractor, or anyone for whose acts the Contractor or subcontractor may be liable.

3.07 Guarantee



The Contractor unconditionally guarantees the Work under this Contract to be in conformance with the Contract Documents and to be and remain free of defects in workmanship and materials not inherent in the quality required or permitted. Contractor shall repair or replace any Work, together with any adjacent Work which may be displaced in so doing, which is not in accordance with the requirements of the Contract or which is defective in its workmanship or material, all without any expense whatsoever to the University for a period of **one (1) year / two (2) years** from the date of Substantial Completion, unless a longer guarantee period is stipulated in the Contract Documents or otherwise available from the manufacturer ("Repair Period").to.

Special guarantees that are required by the Contract Documents shall be signed by the Contractor who is responsible for the entire work and countersigned by the subcontractor who performs the work.

The Contractor further agrees that within five calendar days after being notified in writing by the University of any Work not in accordance with the requirements of the Contract Documents or of any defects in the Work, it shall commence and prosecute with due diligence all Work necessary to fulfill the terms of this guarantee and to complete the Work in accordance with the requirements of the Contract with sufficient manpower and material to complete the repairs as expeditiously as possible. The Contractor, in the event of failure to so comply, does hereby authorize the University to proceed to have the Work done at the Contractor's expense, and it agrees to pay the cost thereof upon demand. The University shall be entitled to all costs necessarily incurred upon the Contractor's refusal to pay the above cost.

Notwithstanding the foregoing paragraph, in the event of an emergency constituting an immediate hazard to health, safety or damage of the University's employees, property, or licenses, the University may undertake at the Contractor's expense, without prior notice, all Work necessary to correct such hazardous conditions caused by the Work of the Contractor not being in accordance with the requirements of this Contract.

The Contractor shall require a similar guarantee in all subcontracts, including the requirement that the University be reimbursed for any damage or loss to the Work or to other Work resulting from such defects.

If required by the Contract Documents, the Maintenance and Guarantee Bond shall be in full force and effect during the entire Repair Period, unless a longer bond period is stipulated in the Contract Documents.

4.00 CONTRACTOR'S COMPENSATION

4.01 Basis of Compensation

In consideration of the full performance of this Agreement by the Contractor, the University shall compensate the Contractor as stated in **Exhibit B**.

4.02 Change Orders and Construction Change Directives

4.02.1 Generally

The University reserves the right to issue written orders whether through a formal Change Order or Construction Change Directive, directing changes in the Contract at any time prior to the acceptance of the Project without voiding the Contract, and Contractor shall promptly comply with such order. A Construction Change Directive may be issued in writing by the University directing the Contractor to perform changed Work in the absence of a final agreement on a Change Order and the costs will be calculated as provided in 6.01.4. The Contractor may request changes in the Work, but shall not act on the changes until approved in writing by the University. Any change made without authority in writing from the University shall be the responsibility of the Contractor.

Any such changes in the Work that have a cost impact shall only be authorized by Change Orders approved by the University. No action, conduct, omission, prior failure or course of dealing by the University shall act to



waive, modify, change or alter the requirement that Change Orders must be in writing and signed by the University and Contractor and that such written Change Orders are the exclusive method for changing or altering the Contract Sum or Contract Time. The University and Contractor understand and agree that the Contract Sum and Contract Time cannot be changed by implication, oral agreements, actions, inaction, course of conduct or Construction Change Directive.

On the basis set forth herein, the Contract Sum may be adjusted for any Change Order requiring a different quantity or quality of labor, materials or equipment from that originally required, and the partial payments to the Contractor, set forth in section 8.01, may be adjusted to reflect the change. Whenever the necessity for a change arises, the Contractor shall take all necessary steps to mitigate the effect of the ultimate change on the other Work in the area of the change. Changed Work shall be performed in accordance with the original Contract requirements except as modified by the Change Order. Except as herein provided, the Contractor shall have no claim for any other compensation including lost productivity or increased overhead expenses due to changes in the Work. The amounts set forth in the Change Order constitute full compensation for both direct and indirect costs of the Work described in the Change Order. Payment by the University pursuant to the Change Order shall constitute full satisfaction of any and all claims for compensation and extension of time by the Contractor for the performance of the Work by the Contractor and all subcontractors.

4.02.2 Proposed Change Orders

The Design Professional, with approval of the University, shall issue to the Contractor a cost request Bulletin for a proposed change order describing the intended change and shall require the Contractor to indicate thereon a proposed amount to be added to or subtracted from the Contract Sum due to the change supported by a detailed estimate of cost. Upon request by the University, the Contractor shall permit inspection of the original Contract estimate, subcontract agreements, or purchase orders relating to the change. Any request for adjustment in Contract Time which is directly attributable to the changed Work shall be included with substantiating detailed explanation by the Contractor in its response to the cost request bulletin. Failure by Contractor to request adjustment of Contract Time in the response to the cost request Bulletin shall waive any right to subsequently claim an adjustment of the Contract Time based on the changed Work. The Contractor shall submit the response to the cost request Bulletin with detailed estimates and any time extension request thereon to the Design Professional and the University's Representative within ten (10) calendar days after issuance of the cost request bulletin. Upon its submission the Design Professional will review it and advise the University who will make the decision. If the Contractor fails to submit the response within the required ten (10) calendar days, and the Contractor has not obtained the Design Professional's and the University's permission for a delay in submission, the University may order the Contractor in writing to begin the Work immediately, and the Contract Sum shall be adjusted in accordance with the University's estimate of cost. In that event, the Contractor, within fifteen days following completion of the changed Work, may present information to the University that the University's estimate was in error; the University, in its sole discretion, may adjust the Contract Sum. The Contractor must keep and submit to the University time and materials records verified by the University to substantiate its costs. The University may require the Contractor to proceed immediately with the changed Work in accordance with section 4.02.4, "Failure to Agree as to Cost" or section 4.02.6 "Emergency Changes."

When the University and the Contractor agree on the amount to be added to or deducted from the Contract Sum and the time to be added to or deducted from the Contract Time and an Impact Report or a Contract Change Order is signed by the University and the Contractor, the Contractor shall proceed with the changed Work. If agreement is reached as to the adjustment in compensation for the performance of changed Work but agreement is not reached as to the time adjustment for such Work, the Contractor shall proceed with the Work at the agreed price, reserving the right to further pursue its Claim for a time adjustment. Any costs incurred to acquire information relative to a proposed Change Order shall not be borne by the University.

4.02.3 Allowable Costs Upon Change Orders



The only estimated or actual costs that will be allowed because of changed Work and the manner in which those costs shall be computed is described by this section.

4.02.3.1 Labor

Costs are allowed for the actual payroll cost to the Contractor for direct labor, engineering or technical services directly required for the performance of the changed Work, (but not site management such as field office estimating, clerical, project engineering, management or supervision) including payments, assessments, or benefits required by lawful labor union collective bargaining agreements, compensation insurance payments, contributions made to the State pursuant to the Unemployment Insurance Code, and for taxes paid to the federal government required by the Social Security Act of August 14, 1935, as amended, unless the time of completion adjustments affect the general condition inclusion of the Contract Sum.

No labor cost will be recognized at a rate in excess of the appropriate wage rates established for that portion of the Work, nor will the use of a classification which would increase the labor cost be permitted unless the Contractor established to the satisfaction of the University the necessity for payment at a higher rate.

4.02.3.2 Materials

Costs are allowed for the actual cost to the Contractor for the materials directly required for the performance of the changed Work. Such cost of materials may include the costs of transportation, sales tax, and delivery if necessarily incurred. However, overhead costs shall not be included. If a trade discount by the actual supplier is available to the Contractor, it shall be credited to the University. If the materials are obtained from a supply or source owned wholly or in part by the Contractor, payment therefor will not exceed the current wholesale price for such materials.

If, in the opinion of the University, the cost of materials is excessive, or if the Contractor fails to furnish satisfactory evidence of the cost from the actual suppliers thereof, then in either case the cost of the materials shall be deemed to be the lowest wholesale price at which similar materials are available in the quantities required at the time they were needed.

4.02.3.3 Equipment

Costs are allowed for the actual cost to the Contractor for the use of equipment directly required in the performance of the changed Work except that no payment will be made for time while equipment is inoperative due to breakdowns or for non-working days. The rental time shall include the time required to move the equipment to the Project site from the nearest available source for rental of such equipment, and to return it to the source. If such equipment is not moved by its own power, then loading and transportation costs will be paid. However, neither moving time nor loading and transportation costs will be paid if the equipment is used on the Project in any other way than upon the changed Work. Individual pieces of equipment having a replacement value of \$500.00 or less shall be considered to be tools or small equipment, and no payment therefor will be made.

For equipment owned or furnished by the Contractor, no cost therefor shall be recognized in excess of the rental rates established by distributors or equipment rental agencies in the locality where the Work is performed. Blue Book rates shall not be used for any purpose.

The amount to be paid to the Contractor for the use of equipment as set forth above shall constitute full compensation to the Contractor for the cost of fuel, power, oil, lubrication, supplies, small tools, small equipment, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, labor (except for equipment operators who shall be paid for as provided in Article 4.02.3.1) and any and all costs to the Contractor incidental to the use of such equipment.

4.02.3.4 Work by Subcontractors and Vendors

For any portion of the changed Work which is to be performed by a subcontractor, the Contractor shall furnish to the University a detailed estimate prepared and signed by subcontractor of the cost to subcontractor for performing the changed Work. At the sole discretion of the University, a lump sum estimate of such cost to subcontractor may be accepted in lieu of the detailed estimate. The combined costs for subcontractor's overhead, profit, taxes, indirect supervision, insurance, bonds shall not exceed ten percent (10%). Estimates of the amount to be deleted from subcontractor's portion of the Work shall be gross cost of the deducted Work plus eight percent (8%). For changed Work to be furnished by a supplier, the Contractor shall furnish upon demand of the University, a lump sum estimate of the cost of the items including taxes and cartage to the Contractor prepared by the supplier. No supplier mark-up for overhead, profit, layout, supervision or bonds will be allowed for changed Work furnished by a supplier.

4.02.3.5 Contractor Mark-up for Added Work

Where changed Work is performed, the Contractor may add to the total estimated actual cost for such Work no more than ten (10%) for subcontractor mark-up and seven and one-half percent (7.5%) for self-performed trade work for profit, overhead, insurance, taxes, indirect supervision, bonds, and any other costs not allowed by section 4.02.01.

4.02.3.6 Credit for Deleted Work

The amount to be deducted from the Contract Sum shall be the total estimated actual cost of the deducted Work plus eight percent (8%).

Where an entire item or section of Work is deleted from the Contract, the entire subcontract cost or bid cost shall be considered the appropriate deduction less the value of Work performed. If the subcontract cost or bid cost is not identifiable, then estimates of the amount to be deducted from the Contract Sum shall be the gross cost of the deducted work plus six percent (6%) for saved overhead, bonds, insurance, and taxes.

For proposed change orders which involve both added and deleted Work, the Contractor shall separately estimate the cost of the added Work before mark-ups, and separately estimate the cost of the deleted Work before allowance of a credit. If the difference between the costs results in an increase to the Contract Sum, the mark-up for added Work shall be applied to the difference, and if the difference in the costs results in a decrease, then the mark-up for deleted Work shall be applied to the difference.

4.02.3.7 Market Values

Cost for added Work shall be no more than market values prevailing at the time of the change, unless the Contractor can establish to the satisfaction of the University that it investigated all possible means of obtaining Work at prevailing market values and that the excess cost could not be avoided.

When a change order deletes Work from the Contract, the computation of the cost thereof shall be the values which prevailed at the time bids for the Work were opened or the Contract Sum established.

4.02.4 Failure to Agree as to Cost**4.02.4.1 For Added Work**

Notwithstanding the failure of the University and the Contractor to agree as to the cost of the proposed Change Order, the Contractor, upon written order from the University, shall proceed immediately with the



changed Work. A Construction Change Directive or letter signed by the University shall be used for this written order. At the start of each day's Work on the change, the Contractor shall notify the University in writing as to the size of the labor force to be used for the changed Work and its location. Failure to so notify may result in the non-acceptance of the costs for that day. At the completion of each day's Work, the Contractor shall furnish to the University a detailed summary of all labor, materials, and equipment employed in the changed Work. The University will compare his/her records with Contractor's daily summary and may make any necessary adjustments to the summary. After the University and the Contractor agree upon and sign the daily summary, the summary shall become the basis for determining costs for the additional Work. The sum of these costs when added to an appropriate mark-up will constitute the payment for the changed Work. Subsequent adjustments, however, may be made based on later audits by the University. When changed Work is performed at locations away from the job site, the Contractor shall furnish in lieu of the daily summary, a summary submitted at the completion of the Work containing a detailed statement of labor, material, and equipment used in the Work. This latter summary shall be signed by the Contractor who shall certify thereon that the information is true.

The Contractor shall maintain and furnish on demand of the University itemized statements of cost from all vendors and subcontractors who perform changed Work or furnish materials and equipment for such Work. All statements must be signed by the vendors and the subcontractors.

4.02.4.2 For Deleted Work

When a proposed Change Order contains a deletion of any Work, and the University and the Contractor are unable to agree upon the cost thereof, the University's estimate shall be deducted from the Contract Sum and may be withheld from any payment due the Contractor until the Contractor presents adequate substantial information to the University that the University's estimate was in error. The amount to be deducted shall be the actual costs to the Contractor for labor, materials, and equipment which would have been used on the deleted Work together with an amount for mark-up as defined in the Contract Documents.

4.02.5 Allowable Time Extensions

For any change in the Work, the Contractor shall only be entitled to such adjustments in Contract Time due solely to performance of the changed Work. The procedure for obtaining an extension of time is set forth in Section 4.08 of these General Conditions. No extension of time shall be granted for a change in the Work unless the Contractor demonstrates to the satisfaction of the University that the Work is on the critical path and submits an updated CPM schedule showing that an extension of time is required and that the Contractor is making, or has made, every reasonable effort to guarantee completion of the additional Work called for by the change within the time originally allotted for the Contract. Failure by the Contractor to make the required submission or showing constitutes a waiver of any possible adjustment in Contract Time.

Any adjustment in Contract time shall specify the exact calendar day.

4.02.6 Emergency Changes

Changes in the Work made necessary due to unforeseen site conditions, discovery of errors in plans or specifications requiring immediate clarification in order to avoid a serious Work stoppage, changes of a kind where the extent cannot be determined until completed, or under any circumstances whatsoever when deemed necessary by the University are kinds of emergency changes which may be authorized by the University in writing to the Contractor. The Contractor shall commence performance of the emergency change immediately upon receipt of written direction from the University.

If agreement is reached as to compensation adjustment for the purpose of any emergency change, then compensation will be as provided in this section relating to ordinary changes. If agreement is not reached as to compensation at the time of commencing the emergency change, then compensation will be as provided in



section 4.02.4, that is, time and materials records and summaries shall be witnessed and maintained until either a lump sum payment is agreed upon, or the changed Work is completed.

4.03 Records and Audit

4.03.1

Contractor's records, which shall include but not be limited to accounting records (hard copy, as well as computer readable data if it can be made available), written policies and procedures; subcontract files (including proposals of successful and unsuccessful bidders, bid recaps, etc.); original estimates; estimating work sheets, correspondence; change order files (including documentation covering negotiated settlements); backcharge logs and supporting documentation; general ledger entries detailing cash and trade discounts earned, insurance rebates and dividends; and any other supporting evidence deemed necessary by the University to substantiate changes related to the Agreement (collectively referred to as "Records") shall be maintained in accordance with Generally Accepted Accounting Principles and open to inspection and subject to audit and/or reproduction by University's agent or its authorized representative to the extent necessary to adequately permit evaluation and verification of Cost of the Work, and any invoices, change order, payments or claims submitted by the Contractor or any of his payees pursuant to the execution of the contract.

4.03.2

Such audits may require inspection and copying from time to time and at reasonable times and places of any and all information, materials and data of every kind and character, including without limitation, records, books, papers, documents, subscriptions, recordings, agreements, purchase order, leases, contracts, commitments, arrangements, notes, daily diaries, superintendent reports, drawings, receipts, vouchers and memoranda, and any and all other agreements, sources of information and matters that may in University's judgment have any bearing on or pertain to any matters, rights, duties or obligations under or covered by any Contract Documents. Such records subject to audit shall also include, but not be limited to, those records necessary to evaluate and verify direct and indirect costs, (including overhead allocations) as they may apply to costs associated with this Agreement.

4.03.3

The University or its designee shall be afforded access to all of the Contractor's Records, and shall be allowed to interview any of the Contractor's employees, pursuant to the provisions of this article throughout the term of this contract and for a period of six (6) years after Final Payment or longer if required by law. To the extent University deems is allowed by law, the Contractor's records shall remain confidential. Contractor recognizes and agrees that University will disclose documents it deems is required or appropriate pursuant to law, defense against lawsuits or other claims, or other reason deemed necessary by University.

4.03.4

Contractor shall require all Subcontractors, insurance agents, and material suppliers (payees) to comply with the provisions of this article by insertion of the requirements hereof in a written contract agreement between Contractor and payee. Such requirements will also apply to Subcontractors and all lower tier Subcontractors. Contractor will cooperate fully and will cause all of Contractor's Subcontractors (including those entering into lump sum contracts, payees or lower tier Subcontractors) to cooperate fully by furnishing or making available to University from time to time whenever requested in an expeditious manner any and all such information, materials and data.

4.03.5

University's agent or its authorized representative shall have access to the Contractor's facilities, shall have access to all records deemed necessary by University; and shall be provided adequate and appropriate work space, in order to conduct review or audits in compliance with this article.

4.03.6

Contractor agrees that University's designee shall have the right to examine the Contractor's records (during the contract period and up to six(6) years after Final Payment is made on the contract) to verify the accuracy and appropriateness of the pricing data used to price change proposals or claims. Contractor agrees that if the University determines the cost and pricing data submitted (whether approved or not) was inaccurate, incomplete, not current or not in compliance with the terms of the contract regarding pricing of change orders, an appropriate contract price reduction shall be made. Such post-approval contract price adjustments will apply to all levels of Contractors and/or Subcontractors and to all types of change order proposals specifically including lump sum change orders, unit price change orders and cost-plus change orders.

4.03.7

If an audit, inspection or examination in accordance with this article, discloses overcharges (of any nature) by the Contractor to the University in excess of one percent (1%) of the total contract billings, the actual cost of the University's audit shall be reimbursed to the University by the Contractor. Any adjustments and/or payments which must be made as a result of any such audit or inspection of the Contractor's invoices and/or records shall be made within a reasonable amount of time (not to exceed 90 days) from presentation of University's findings to Contractor.

4.03.8

If this Agreement is determined to be subject to Section 1861(v)(1)(I) of the Social Security Act, as amended from time to time, the Contractor agrees that for a period of four (4) years following the expiration or earlier termination of this Agreement, the Contractor shall retain and make available to the Secretary of Health and Human Services, the Comptroller General of the United States, or any of their duly authorized representatives, this Agreement, and any books, documents, and records of the Contractor which are necessary to certify the nature and extent of amounts paid by the University pursuant to this Agreement. In the event access to books, documents, and records is requested by the Secretary, the Comptroller General, or any of their duly authorized representatives, the Contractor shall immediately notify the University and make such books, documents and records available to the University unless prohibited by law.

4.04 Applications for Payment

The Contractor shall prepare and deliver to the University monthly an itemized Application for Payment. The University shall pay the Contractor within thirty (30) days of receipt of a properly submitted, complete and correct Application for Payment. The Applications for Payment shall include a Schedule of Values describing the services included and Work completed in the Application for Payment. No interest shall accrue on any unpaid portion of the Applications for Payment or any other sums that the Contractor or any Subcontractor or supplier claim are or may be due under this Agreement.

The Application for Payment shall constitute a representation by the Contractor to the University that 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. No progress payment, partial use or entire use of the Project by the University shall constitute acceptance of work not in strict conformity with the Contract Documents.



The Contractor shall keep records of cost and expense to support the Contractor's Applications for Payment, including without limitation records of staff time, material costs, and reimbursable expense items in connection with the Work. Financial records shall be kept on a generally recognized accounting basis, as approved by the University. Contractor shall make them readily available to the University or its representatives for inspection and audit for a period of six (6) years after the Project Close-out and Final Payment to the Contractor.

The Application for Payment shall be accompanied by a Sworn Statement completed by the Contractor, together with Certified Payrolls prepared in accordance with Section 5.02, as well as other documentation that may be required by the University, stating that all Subcontractors and suppliers have been paid in full for Work performed through the last or most recent progress payment.

4.05 Retainage

Payments to the Contractor shall be subject to retainage of ten percent (10%) of the Cost of Work for each Application for Payment until the Work is fifty percent (50%) complete; at that time, no further retainage will be deducted from the Applications for Payment. Draws on retainage may only be submitted after Substantial Completion and in the following quantities: (1) at the completion of all Punchlist items, the retainage may be reduced to two percent (2%); and (2) at delivery of all Closeout Documents and warranties, the remainder of the retainage may be paid to the Contractor. Any release of retainage shall be at the sole discretion of the University.

4.06 Final Payment

Issuance of Final Payment shall be expressly conditioned on certification of Substantial Completion, certification of Punchlist completion and written acceptance of closeout documents by the Design Professional and University.

5.00 PREVAILING WAGES

5.01 Applicable Wage Rates

The Contractor acknowledges and shall abide by the University's prohibition on use of 1099 independent contractors and owner / operator business entities wherein such individuals or entities are not able to secure and maintain workers compensation insurance. The Contractor shall ensure that all classifications of laborers and construction mechanics performing Work on the Project job site are employees of the Contractor or any subcontractor for any tier thereof, and that each worker is covered by workers compensation insurance.

For this project, it is a University requirement that the Contractor and all Subcontractors and sub-subcontractors who provide labor on this project shall compensate each worker, regardless of their employment status, not less than the wage and fringe benefit rates prevailing in the locality in which the work is to be performed. At the time of advertising for bids on the project, the University shall provide the prevailing rates of wages and fringe benefits for all classes of construction mechanics called for in the Contract. A schedule of these rates shall be made a part of the specifications for the work to be performed and shall be printed on the bidding forms where the work is to be done by contract. Contractor shall also post on site, in a conspicuous place, a copy of all applicable wage and benefit rates, and shall provide the University with a copy of the applicable wage and benefit rates posted.

5.02 Certified Payroll Records and Supporting Documents



The Contractor and each Subcontractor shall keep an accurate record showing the name and occupation of and the actual benefits and wages paid to each laborer and mechanic working in connection with this contract and shall be submitted with each pay application in accordance with Section 4.04. Contractor shall be required to 1) collect all certified payroll records from Contractor and Subcontractors and sub-subcontractors; 2) provide and require Subcontractors and sub-subcontractors to provide the University access to supporting documentation, and 3) shall provide this information, records, and/or access to documentation to the University or its agent(s) or auditors for review or audit promptly on request. Contractor shall, and shall also require all subcontractors and sub-subcontractors to, promptly provide information relating to payroll and job classification and work duties to University upon request. The University reserves the right to audit Contractor, Subcontractors, and sub-subcontractors for compliance with wage and hour requirements, prevailing wage, employee classifications and other applicable requirements.

5.02.1 Audit

In connection with the prevailing wage rate audit conducted by the University, the Contractor is required to maintain and/or promptly obtain the following information, records and documentation from Contractor, all Subcontractors, and all sub-subcontractors and to promptly provide them to the University upon request:

1. Canceled payroll checks
2. Pay stubs
3. Weekly time cards on time sheets
4. Payroll registers
5. Employee handbook
6. Fringe benefit plan documents
7. Minutes of Board of Directors meetings
8. Worksheets for calculation of non-cash fringe benefit amounts included in compensation
9. Apprentice certificates and other documents to verify registration of all apprentices in recognized apprentice program certified by the Bureau of Apprenticeship and Training (B.A.T.) of the U.S. Dept. of Labor or an acceptable equivalent
10. Other related documents as requested by the University.

5.02.2 Failure to Comply with Audit

If the requested information and/or records are not promptly provided pursuant to University's request, in addition to all other rights and remedies it has pursuant to law, equity and contract, the University, by written notice to Contractor and the sureties of the contractor known to the University may, but has no obligation or duty to, 1) terminate the contract with Contractor and University owe Contractor and be liable only for that prorated portion of satisfactorily completed work up to the date of termination; 2) withhold further payments owed until Contractor supplies the requested information and records and/or otherwise complies with the request for records and/or access to documentation; and 3) inform the Vice-President for Finance and Business Operations of what has been requested and what has not been provided by Contractor and/or subcontractor or sub-subcontractor. Contractor is hereby given express notice that failure to comply with University's requests for information and records may disqualify Contractor and/or non-complying Subcontractors/sub-subcontractors from bidding and/or receiving work on future University projects. The University may proceed to complete this contract by separate agreement with another contractor or otherwise and the original Contractor and its sureties shall be liable to the University for any excess cost occasioned thereby.

5.03 Classification of Workers



All apprentices utilized on this University project must be registered in a recognized apprentice program, i.e., one that is certified by the Bureau of Apprenticeship (B.A.T.), U.S. Department of Labor. The workers used on a University project by either Contractor or a Subcontractor must be employees of the Contractor or Subcontractor and not individuals claimed as subcontractors or independent contractors, such as individuals whose compensation is reflected on IRS form 1099. The use of individuals as independent contractors is prohibited without express written permission of the University.

5.04 Failure to Pay

If a Contractor or subcontractor fails to pay the prevailing rates of wages and fringe benefits and does not cure such failure within fourteen (14) days after notice to do so by the University, the University shall have the right, at its option, to do any or all of the following:

5.04.1

Withhold all or any portion of payments due the Contractor as may be considered necessary by the University to pay laborers and mechanics the difference between the rates of wages and fringe benefits required by this Agreement and the actual wage and fringe benefits paid.

5.04.2

Terminate part or all of this Agreement or any subcontract and proceed to complete the Agreement or subcontract by separate agreement with another contractor or otherwise, in which case the Contractor and its sureties shall be liable to the University for any excess costs incurred by the University.

5.04.3 University's Rights Cumulative

It is expressly understood by both parties that the above are in addition to University's other rights and remedies, and University retains all other rights and remedies it has pursuant to this Agreement, or otherwise, to enforce its rights to require that prevailing wages and fringe benefits be paid for the construction work on this Project, but the University shall have no duty or contractual obligation to enforce these provisions. Contractor agrees that it shall be solely responsible for ensuring that these requirements are met and shall handle and defend all complaints or claims regarding wage payments to construction mechanics without assistance or involvement of the University. Contractor shall permit its employees and workers, and its Subcontractors and sub-subcontractors and their employees and workers, to discuss payment and work duty information with University staff, but otherwise Contractor shall continually prohibit its employees and workers, and all subcontractors and sub-subcontractors and their employees and workers, from directing or making any claims or complaints regarding the payment of wages to any employee or official of the University, and shall indemnify and reimburse University for all expenses and fees, including attorney fees, which it incurs for defending or representing itself against such claims or complaints. The University shall not be asked to nor be responsible to address or resolve any disputes with or between Subcontractors on the Project.

5.05 Application to Subcontractors

The Contractor shall include terms identical or substantially similar to this section in all Subcontracts, Purchase Orders and other agreements pertaining to the Project.

6.00 OWNERSHIP OF ELECTRONIC OR HARD-COPY DOCUMENTS

All drawings and specifications and other data and materials prepared and furnished whether in electronic or hard-copy format by the University, the Design Professional and/or the Contractor shall become the property of the University. The Contractor shall have no claim for further employment or additional compensation as a



result of exercise by the University of its full rights to ownership of such documents, information, data and materials. The Contractor shall not use or copy such documents, information, data or materials in any format for any purpose other than for the Project.

7.00 SUCCESSORS AND ASSIGNS

This Agreement shall be binding upon and inure to the benefit of the parties to this Agreement and their respective successors and assigns; provided, however, that none of the parties hereto shall assign this Agreement without the prior written consent of the other.

8.00 CLAIMS, DISPUTES AND GOVERNING LAW

8.00 CLAIMS AND DISPUTES

8.01 Claims Definition

A Claim is a demand or assertion by one of the parties seeking adjustment or interpretation of Contract terms, 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 parties arising out of or relating to the Contract. Claims must be made by written notice within a specified time period. The responsibility to substantiate Claims shall rest with the party making the Claim.

8.01.1 Policy of Cooperation

The parties shall endeavor to resolve all of their claims and disputes amicably and informally through open communication and discussion of all issues relating to the Project. To the greatest extent possible, the parties shall avoid invoking the formal dispute resolution procedures contained in the Contract Documents.

8.02 Recommendation of Design Professional

Claims must be referred initially to the Design Professional for action as provided in paragraph 8.10 as an express condition precedent to proceeding further in resolving any claim.

8.03 Time Limits on Claims

Claims must be made within 5 business days after occurrence of the event giving rise to such Claim or within 5 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Claims must be made by written notice. An additional Claim made after the initial Claim has been resolved by Change Order will not be valid.

8.04 Continuing Contact Performance

Pending final resolution of a Claim, unless otherwise agreed in writing, the Contractor shall proceed diligently with performance of the Contract and the University shall continue to make payments in accordance with the Contract Documents subject to the University's rights relative to payments, withholding of payments, termination, or all other rights afforded it in the Contract Documents.

8.05 Claims for Concealed or Unknown Conditions

If conditions are encountered at the site which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, 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, then written notice by the observing party shall be given to the other party promptly before conditions are disturbed and in no event later than 24 hours after first observance of the conditions. The Design Professional will promptly investigate such conditions and, if the conditions 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, the Design Professional will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Design Professional 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 Design Professional shall so notify the University and Contractor in writing, stating the reasons. Claims by either party in opposition to such determination must be made within 5 days after the Design Professional has issued such determination. If the University and Contractor cannot agree on an adjustment in the Contract Sum or Contract Time, the adjustment shall be referred to the Design Professional for initial determination, subject to further proceedings pursuant to Paragraph 8.09.

8.06 Claims for Additional Cost

Any Claim by the Contractor for an increase in the Contract Sum shall be submitted in writing as required by the Contract Documents before proceeding to execute the Work. If the Contractor believes additional cost is involved for reasons including but not limited to (1) a written interpretation from the Design Professional, (2) an order by the University to stop the Work where the Contractor was not at fault, (3) a written order for a minor change in the Work issued by the Design Professional, (4) failure of payment by the University, (5) termination of the Contract by the University, (6) University's suspension or (7) changes in the scope of Work, the Contractor's claim shall be filed in strict accordance with the procedure established herein.

8.07 Claims for Additional Time

Any Claim by Contractor for an increase in the Contract Time shall be submitted in writing as required by this provision and the Contract Documents. The Contractor's Claim shall include an estimate of the probable effect of delay on progress of the Work. In the case of a continuing delay only one Claim is necessary.

As a precondition for the Claim to be considered by the University, Contractor must identify the precise activities affected as located on the approved network Project Schedule. Contractor must also describe the efforts that it has made to mitigate the effects of any negative schedule impact.

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 and location and could not have been reasonably anticipated, and that the abnormal weather conditions had an adverse effect on the scheduled construction.

8.08 Injury or Damage to Person or Property

If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, of any of the other party's employees or agents, or of others for whose acts such party is legally liable, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 5 days after first observance. The notice shall provide sufficient detail to enable the other party to investigate the matter. If a Claim for additional cost or time related to this Claim is to be asserted, it shall be filed as provided in the Contract Documents.

8.09 Verification of Claims Submitted

With respect to any Claim asserted by Contractor for itself or on behalf of a Subcontractor for additional time or cost, the Contractor shall evaluate the claim and verify that any amounts claimed are valid, compiled in accordance with generally accepted accounting principles and are consistent with the terms of the existing

contractual agreements regarding entitlement before presentation of the Claim to the Owner. Any Claim not verified in accordance with this requirement shall be denied without further recourse by the Contractor or Subcontractor.

8.10 Resolution of Claims and Disputes

8.10.1 Review by Design Professional

Design Professional will review all Claims and take one or more of the following preliminary actions within 10 days of receipt of a Claim: (1) request additional supporting data from the claimant, (2) submit a schedule to the parties indicating when the Design Professional expects to take action, (3) reject the Claim in whole or in part, stating reasons for rejection, (4) recommend approval of the Claim by the other party or (5) suggest a compromise. The Design Professional may also, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim.

If a Claim has been resolved, the Design Professional will prepare or obtain appropriate documentation. If a Claim has not been resolved, the party making the Claim shall, within 10 days after the Design Professional's preliminary response, take one or more of the following actions: (1) submit additional supporting data requested by the Design Professional, (2) modify the initial Claim or (3) notify the Design Professional that the initial Claim stands.

If a Claim has not been resolved after consideration of the foregoing and of further evidence presented by the parties or requested by the Design Professional, the Design Professional will notify the parties in writing that the Design Professional's opinion will be rendered within 5 days. Upon expiration of such time period, the Design Professional will render to the parties the Design Professional's written opinion relative to the Claim, including any change in the Contract Sum or Contract Time or both. If there is a surety and there appears to be a possibility of a Contractor's default, the Design Professional may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy. The opinion of the Design Professional shall be subject to the review of the Vice-President for Finance and Business Operations Wayne State University (VPFBO).

8.10.2 Review by Vice-President for Finance and Business Operations

The Vice-President for Finance and Business Operations (VPFBO) shall review the Design Professional's opinion and the supporting information submitted by the parties for the purpose of upholding the Design Professional's opinion, modifying the Design Professional's opinion, or rejecting the Design Professional's opinion. The VPFBO shall render a decision within forty-five days of the completion of any submissions by the parties. The decision of the VPFBO is final unless it is challenged by either party by filing a lawsuit in the Court of Claims of the State of Michigan within one year of the issuance of the decision.

8.10.3 Jurisdiction

Jurisdiction over all claims, disputes, and other matters in question arising out of or relating to this Contract or the breach thereof, shall rest in the Court of Claims of the State of Michigan. No provision of this agreement may be construed as the University's consent to submit any claim, dispute or other matter in question for dispute resolution pursuant to any arbitration or mediation process, whether or not provisions for dispute resolution are included in a document which has been incorporated by reference into this agreement.

8.10.4 Condition Precedent

The process and procedures described in Section 8.10 are an express condition precedent to filing or pursuing any legal remedy including litigation. Pursuing litigation prior to exhaustion of the Dispute Resolution process set forth herein shall be premature and a material breach of this Agreement.



8.10.5 Governing Law

This Agreement shall be governed by and construed in accordance with the laws of the State of Michigan.

9.00 NON-DISCRIMINATION

9.01 General

The Contractor shall not discriminate against any job applicant, contractor, or employee because of race, color, religion, national origin, age, sex (including gender identity) height, weight, or familial, disability, or veteran status, and shall include terms identical or substantially similar to this section in all Subcontracts, Purchase Orders and other agreements pertaining to the Project.

9.02 Solicitation/Advertisements

The Contractor shall in all solicitation or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, national origin, age, sex (including gender identity), height, weight, or familial, disability or veteran status.

9.03 Rules/Laws

The Contractor shall comply with all applicable federal and state laws, and current published rules, regulations, directives, and orders of the Michigan Civil Rights Commission and other governmental agencies/departments.

9.04 Reports

The Contractor shall furnish and file compliance reports within such time and upon such forms as provided by the Michigan Civil Rights Commission; these forms may also elicit information as to the practices, policies, program, and employment statistics of the Contractor and of each Subcontractor. The Contractor shall permit access to all books, records, and accounts by the Michigan Civil Rights Commission and/or its agents, for purposes of investigation to ascertain compliance with this contract and with rules, regulations, and orders of the Michigan Civil Rights commission.

9.05 Persons with Disabilities

The Contractor shall comply with the provisions of the Michigan Persons with Disabilities Civil Rights Act (M.C.L. 37.1101, et seq.).

9.06 Contract Provisions

The Contractor shall include, or incorporate by reference, the provisions of this Article in every Subcontract, Subcontract and purchase order unless exempted by the rules, regulations or orders of the Michigan Civil Rights Commission, and shall provide in every Subcontract, subcontract or purchase order that said provisions shall be binding upon each Subcontractor, subcontractor or seller.

10.00 ADDITIONAL PROVISIONS

10.01 Prohibited Contracts or Subcontracts due to Unfair Labor Practices



Public Act No. 278 of 1980 prohibits State of Michigan from awarding Contract or Subcontract to employer who has been found in contempt of court by a Federal court of appeals, on not less than three (3) occasions involving different violations during preceding seven (7) years, for failure to correct unfair labor practice as prohibited by Section 8 of Chapter 372 of National Labor Relations Act, 29 U.S.C. 158. Contractor may not in relation to that Contract subcontract with such employer. The University may rescind, or require Contractor to rescind a contract if the employer or Subcontractor, manufacturer, or supplier of employer subsequently appears in register of such employers which will be compiled by Michigan's Department of Licensing and Regulatory Affairs, pursuant to Section 2 of Public Act No. 278 of 1980.

10.02 Buy-American

University endeavors to buy products made in the United States of America whenever an American-made product is available that meets or exceeds the specifications requested and the price is equal to or lower than foreign-made product. Vendors and Contractors are instructed to bid American-made products and/or services whenever available. Vendors and Contractors may bid foreign-made products or services when:

1. those products or services are specified, or
2. as an alternate as long as the products or services are technically acceptable to the University and American-made goods or services that are competitively price and of comparable quality are not available.

A product or service shall be considered "American-made" if more than 50% of the product is manufactured or assembled in the United States or more than 50% of the services are performed in the United States.

10.03 Michigan Products

Contractor and its Subcontractors and suppliers shall utilize Michigan-made products whenever possible where price, quality and performance are equal to or better than non-Michigan products.

10.04 Drug and Alcohol Testing

The University is a "DRUG FREE WORKPLACE", and the University requires Contractors, Subcontractors and sub-subcontractors with access to the work site to abide by the University's policies on drugs, alcohol and tobacco, which can be found at http://bog.wayne.edu/code/2_20_04.php and <http://policies.wayne.edu/administrative/00-03-smoke-free-campus.php>. All costs for initial and periodic testing shall be borne by the Contractor.

1. The Contractor and University shall reserve the right to administer drug and alcohol tests to any and/or all site personnel at random periods and without notice.
 - a. The Contractor shall be responsible for all costs including wages for those individuals testing drug or alcohol-free at the Contractor's direction.
 - b. Subcontractors shall be responsible for all costs including wages for those individuals not testing drug or alcohol-free at the direction of the Contractor, and the Subcontractor shall immediately remove those individuals from the site.
4. Any individual not testing drug or alcohol-free shall not be allowed to return to the site under any circumstances.

10.05 Other University Policies



The University's policies related to Duty to Report Criminal Acts and Weapons on Campus shall apply to this Project and Contractor shall include this requirement in all Subcontracts, purchase orders and supply agreements.

10.06 University Representative

The University's Representative shall be the Associate Vice President of Facilities Planning and Management, the Senior Director of Design and Construction Services, the Director of Design and Construction Services and the Project Manager . Any project decision on behalf of the University may only be in accordance with the Authorization Matrix that is attached as Exhibit C and incorporated by reference.

11.00 INCLUSION BY REFERENCE

This Contract and Contract Documents hereby include and incorporate by reference the General Conditions of Construction and Supplementary General Conditions, the Request for Proposal by University, the approved plans and specifications, Contractor's Bid or Proposal insofar as it is not inconsistent with the other Contract Documents and other Project documents attached as Exhibits.

Exhibit A – Contractor's Bid or Proposal

Exhibit B – Basis of Compensation

Exhibit C - Authorization Matrix

Exhibit D – Staffing Plan

12.00 TERMINATION

12.01 Termination by the University for Cause

12.01.1

The University may terminate the Contract if the Contractor: (a) becomes insolvent; (b) files or has filed against it any Petition in Bankruptcy or makes a general assignment for the benefit of its creditors; (c) fails to pay, when due, for materials, supplies, labor, or other items purchased or used in connection with the Work; (d) refuses or fails to prosecute the Work, or any separable part thereof, with such diligence as will ensure the completion of the Work in accordance with the Master Project Schedule; (e) in the University's opinion, persistently fails, refuses or neglects to supply sufficient labor, material or supervision in the prosecution of the Work; (f) interferes with or disrupts, or threatens to interfere with or disrupt the operations of the University, or any other Contractor, supplier, subcontractor, or other person working on the Project, whether by reason of any labor dispute, picketing, boycotting or by any other reason; or (g) commits any other breach of this Contract.

When any of the above reasons exist, the University may, without prejudice to any other rights or remedies of the University and after giving the Contractor and the Contractor's surety, if any, three days written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety: (1) take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor; (2) accept assignment of subcontracts; and (3) finish the Work by whatever reasonable method the University may deem expedient.

When the University terminates the Contract for one of the stated reasons, the Contractor shall not be entitled to receive further payment until the Work is finished.

12.01.2



If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Design Professional's services and expenses made necessary thereby, the remaining balance shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the University. The amount to be paid to the Contractor or University, as the case may be, shall be certified by the Design Professional, upon application, and this obligation for payment shall survive termination of the Contract.

12.02 Suspension by the University for Convenience

12.02.1

The University 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 University may determine.

12.02.2

An adjustment shall be made for increases in the cost and/or time of performance of the Contract, including profit on the increased cost of performance, caused by suspension, delay or interruption. 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 this Contract.

Adjustments made in the cost of performance may have a mutually agreed fixed or percentage fee.

12.03 Termination By The University For Convenience

12.03.1

The University, with or without cause, may terminate all or any portion of the services by the Contractor under this Agreement, upon giving the Contractor 30 days written notice of such termination. In the event of termination, the Contractor shall deliver to the University all reports, estimates, schedules, subcontracts, Contract assignments, purchase order assignments, and other documents and data prepared by it, or for it, pursuant to this Agreement.

12.03.2

Unless the termination is for cause, the Contractor shall be entitled to receive only the payments provided for in Article 4, pro-rated to the date of termination (including payment for the period of the 30-day notice) plus reimbursement for approved and actual costs and expenses incurred by the Contractor to the date of termination. Prior to payment, the Contractor shall furnish the University with a release of all claims against the University.

12.04 Termination By The Contractor

12.04.1

The Contractor may terminate the Contract if the Work is stopped for a period of 60 days through no act or fault of the Contractor or a subcontractor, sub-subcontractor or their agents or employees or any other persons performing portions of the Work under Contract with the Contractor, for any of the following reasons: (1) issuance of an order of a court or other public authority having jurisdiction; (2) an act of government, such



as a declaration of national emergency, making material unavailable; (3) because the Design Professional has not approved a Certificate for Payment and has not notified the Contractor of the reason for withholding approval, or because the University has not made payment of undisputed amounts on an approved Certificate for Payment within the time stated in the Contract Documents; (4) if repeated suspensions, delays or interruptions by the University 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.

If one of the above reasons exists, the Contractor may, upon seven additional days' written notice to the University and Design Professional, terminate the Contract and recover from the University payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead and profit.

12.04.2

If the Work is stopped for a period of 60 days through no act or fault of the Contractor or a subcontractor or their agents or employees or any other persons performing portions of the Work under Contract with the Contractor because the University has persistently failed to fulfill the University's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the University and the Design Professional, terminate the Contract and recover from the University as provided in Subparagraph 12.03.2

13.00 COMPLETE AGREEMENT

The Contract Documents constitute the entire agreement between the parties and supersede any prior discussions or negotiations. Any modification of these Contract Documents must be in writing and signed by the duly authorized representatives of the parties.

IN WITNESS WHEREOF, each of the parties has caused this Agreement to be executed by its duly authorized representative on the dates shown beside their respective signatures, with the contract to be effective upon the date set forth above.

CONTRACTOR

By: _____

Name: _____

Title: _____

Date: _____

UNIVERSITY

By: _____

Name: _____

Title: _____

Date: _____



GENERAL CONDITIONS (Version 11-01-2016)

Complete Documents can be downloaded at

http://www.forms.procurement.wayne.edu/RFPs/General_Conditions_General_Contractor_1_3_2017.docx

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WAYNE STATE
UNIVERSITY

USB Roof & Structure Repairs
WSU Project No. 060-313960



GENERAL CONDITIONS OF CONSTRUCTION

1.00 DEFINITIONS

Bulletin - A bulletin is defined as a compilation of changes to the scope of the work issued by the Design Professional or University which requests the Contractor to submit a quote for the changes.

Change Order - A written agreement entered into after the award of the Contract which alters or amends the executed Contract.

Claim - A Claim is a demand or assertion by one of the parties seeking adjustment or interpretation of Contract terms, 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 parties arising out of or relating to the Contract. Claims must be made by written notice. The responsibility to substantiate Claims shall rest with the party making the Claim.

Close-out Documents - Close-out Documents shall include as-built record drawings and specifications, Operations and Maintenance Manuals, Requests for Information (RFIs), submittals, shop drawings, coordination drawings, warranties, unconditional lien waivers and governing approvals.

Cost of Work - The term Cost of Work, as used herein, is that portion of the Project Cost, that is the estimated or actual labor and material costs of that Work performed (or to be performed) on the Project by the Contractor and all subcontractors, and is inclusive of the cost of construction as described by divisions of the Construction Specifications Institute or other standard format, which constitutes the Direct Cost of Work. However, Cost of Work shall not include the Indirect Cost of Work as herein defined.

Contract - The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a duly executed written Change Order.

Contract Documents - The Contract Documents consist of the bonds, insurance certificates, plans, specifications, drawings, bulletins, addenda, Agreement, General Conditions of Construction, Supplementary General Conditions, Change Orders, Contractor's Bid, and to the extent not otherwise inconsistent with any other Contract Document.

The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Project. 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 to be consistent with the Contract Documents and the highest standard of care. In the case of an inconsistency between, or perceived omission or error in the Drawings, Specifications, or other Contract Documents which is not clarified by addendum or Requests for Information (RFI), or should the Contractor be in doubt as to their exact meaning, the Contractor shall notify the Design Professional and the University at once. The University shall not be responsible for the Contractor's misinterpretations of Drawings and Specifications and/or other Contract Documents.

Nothing contained in the Contract Documents shall create a contractual relationship between University and any third party; however, the University is an intended third-party beneficiary of all contracts for design and



engineering services, all subcontracts, purchase orders and other agreements between Contractor or Design Professional and third parties. The Contractor and Design Professional shall incorporate the obligations of the Contract Documents into its respective subcontracts, agreements and purchase orders.

Contractor: The term "Contractor" as used in the General Conditions shall include the term "Construction Manager" as used in the Contract for Construction Management Services.

Contractor's Construction Schedule- The construction schedules required by the Contract Documents shall be a logic network prepared in the critical path method or other sequential network in use within the construction industry and shall depict: (1) a sequence of operations mutually agreeable to the University, Design Professional and Contractor; (2) the dates of commencement and completion of each task of the Work (including lead time activities, drawing and sample submissions, bidding, awarding Trade Contracts, manufacturing and shipping); (3) delivery dates for materials and equipment; and (4) at the University's request shall include all Finish Work to be performed by separate Contractors. The construction schedule includes a complete itemized breakdown of the Work.

Contract Sum- The Contract Sum shall be the total dollar value of the Agreement between the University and Contractor.

Delay – A delay shall be recognized as a time of completion impact on the performance of the Work by the Contractor that extends the overall duration of the Project beyond the substantial completion and final completion dates specified in the Agreement. A delay shall not be recognized if the time of completion impact on the performance of the Work occurs on a non-critical path activity, and does not extend the overall duration of the Project.

Day - "Days" means calendar days unless specifically provided to the contrary herein or in the Construction Agreement; provided, however, if any day falls on a weekend or a holiday, same shall refer to the next business day thereafter.

Design Professional - The Design Professional is the person lawfully licensed to practice architecture or engineering or an entity lawfully practicing architecture or engineering identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Design Professional" means the Design Professional or the Design Professional's authorized representative.

Final Completion - "Final Completion" means the completion of all the Work in accordance with the Contract Documents and the acceptance thereof by the University. Completion of the Work includes (1) full performance of all Contract terms; (2) acceptance of the Work by University; (3) resolution of all outstanding Changes of Contract; (4) completion of all "punch-list" items; and (5) delivery of all Close-out Documents.

Incomplete Construction List – The Incomplete Construction List is prepared by the Contractor for review by Design Professional and University identifying Work remaining to be completed at the time of Substantial Completion and the date by which Contractor shall complete the Work on the Incomplete Construction List.

Knowledge - The terms "knowledge," "recognize" or "discover," their respective derivatives and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows or should know, recognizes or should reasonably recognize and discovers or should reasonably discover in exercising the care, skill and diligence required by the Contract Documents.

Master Project Schedule - The Master Project Schedule shall show the sequence, duration in calendar days, interdependence for the complete performance of all Work. The Master Project Schedule shall begin with the date of issuance of the Notice to Proceed and conclude with the date of final completion.



Notice to Proceed - A "Notice to Proceed" means written notice given by the University to the Contractor fixing the date on which the Contract Time will commence to run and/or on which Contractor shall start to perform Contractor's obligations under the Contract Documents. A Notice to Proceed by the University shall authorize all or a portion of the Work for the Costs so defined.

Persistently fails - The phrase "persistently fails" and other similar expressions, as used in reference to the Contractor, shall be interpreted to mean any combination of acts and omissions, which cause the University to reasonably conclude that the Contractor will not complete the Work within the Contract Time, or for the Contract Sum or in substantial compliance with the requirements of the Contract Documents.

Plans - The drawings prepared by the Design Professional and accepted by the University which include elevations, sections, details, schedules, diagrams, information, notes, or reproductions or any of these, and which show the location, character, dimension, or details of the Work. These include the graphic and pictorial portions of the Contract Documents as listed in the Agreement.

Preliminary Project Cost and Schedule Impact Report – The direction from the University to perform changed Work in the absence of agreement between the University and Contractor, which may result in a Change Order upon agreement of the cost or schedule impact.

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 University or by separate Contractors.

Punchlist - Punchlist items shall include all Work remaining on the Contractor's Incomplete Construction List and additional items documented by the Design Professional, Contractor and University and issued to the Contractor and may be issued with a Certificate of Substantial Completion. It is understood and accepted that the Punchlist included with the Certificate of Substantial Completion may not represent all remaining Work for which the Contractor is obligated and that Punchlist may be expanded prior to Final Completion.

Reasonably inferable - The phrase "reasonably inferable" and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a Contractor familiar with the Project and exercising the care, skill and diligence required by Contract Documents.

Site - The area specified in the Contract Documents and the area made available for the Contractor's operation.

Soft Costs - "Soft Costs" are those costs derived by the University and shall include, but not be limited to, items such as Environmental services, State administration fees, Design Professional fees, moving furniture, fixtures and equipment, and telecommunications, unless otherwise agreed to by the Parties.

Specifications - The term Specifications shall mean the written instructions and requirements prepared by the Design Professional which complement the plans and which describe the manner of executing the Work or the qualities and types of materials to be furnished.

Statement of Probable Cost - The Statement of Probable Cost, as developed by the Contractor, is essential to the budgetary and management processes of the University. The Statement of Probable Cost, once established and accepted by the University, is relied upon by the University for its subsequent budgetary planning and financial needs for the Project.

The Statement of Probable Cost, applicable to either an estimated or actual cost, is the sum of all costs for a completely constructed, functionally ready-for-use project, in accordance with the scope, scheme, concept, and statement, as developed, documented and accepted by the University, and as constructed by the



accepted contracting method or methods. The Contractor shall provide Statements of Probable Cost as needed during the Project to aid the University and Design Professional in making scope of work selection decisions, especially during design phase and minimally at the end of each design phase of the Project and shall include all costs included in the Contract Sum. The University shall be responsible for the derivation and provision of all Soft Costs that comprise the Project scope and budget.

Subcontractor - The term "subcontractor" shall mean any business entity under contract to the Contractor for services on or regarding the Project. The term "Subcontractor" as used in the General Conditions shall be synonymous with the term "Trade Contractor" as used in the Contract for Construction Management Services. Nothing contained in this contract shall create any contractual relationship between the University and any subcontractor. However, the University is the intended third-party beneficiary of all contracts for design, engineering or consulting services, all Trade Contracts, subcontracts, purchase orders and other agreements between the Contractor and third parties. The Contractor shall incorporate the obligations of this Agreement into its respective Trade Contracts, subcontracts, supply agreements and purchase orders.

Substantial Completion - "Substantial Completion" shall mean 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 the University can occupy or utilize the Work for its intended use. Substantial Completion shall only be determined as described in the Contract Documents.

Unsafe Persons – Unsafe persons shall be those individuals that present a safety hazard to themselves or others.

University - The University 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 term "University" means the University or the University's authorized representative. Any reference to "Board of Governors" shall be considered to mean "University."

University's Representative - The University's Representative shall include the Associate Vice President for Facilities Planning and Management, the Senior Director of Design and Construction Services, the Director of Design and Construction Services and the Project Manager. Any project decision on behalf of the University may only be in accordance with the Authorization Matrix.

Vice President of Finance and Business Operations - The Vice President of Finance and Business Operations shall be the level of review over the Associate Vice President of Facilities Planning & Management.

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, licenses, permits, insurance 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.

2.00 BIDDING

2.01 Duty to Carefully Examine These Instructions

Prospective bidders for this project shall carefully examine the instructions contained herein and be cognizant of and satisfied with the conditions which must be satisfied prior to submitting a proposal and to the conditions which affect the award of the Contract.

2.02 Disclosure of Bidders



The Contractor shall only accept proposals from Subcontractors who are acceptable to the University.

2.03 Clarification During Bidding

The Contractor shall examine the plans and specifications in preparing the bid and shall immediately report to the Design Professional any omissions, discrepancies, or apparent errors found in the plans and specifications. Prior to the date of bid opening, bidders shall submit a written request for clarification in accordance with the instruction contained in the request for bids. If time permits, such clarification shall be issued in the form of addenda to all bidders.

2.04 Bidding Documents

2.04.1 Bid Proposal Package

Each bidder will receive a bid proposal package containing a standard proposal form which shall be used for bidder's proposal. Each proposal shall give the prices proposed in the manner required by the proposal and shall be signed by the bidder or the bidder's duly authorized representative, with its address and telephone number. If the proposal is made by an individual, the individual's name, postal address, and telephone number must be shown. If made by a partnership, the proposal shall have the signature of all partners or an affidavit signed by all partners empowering one partner as an agent to act in their behalf and the address and telephone number of the partnership. A proposal submitted by a corporation shall show the name of the state in which the corporation is chartered, the name of the corporation, its address and telephone number, and the title of the person who signs on behalf of the corporation.

2.04.2 Listing of Proposed Subcontractors Acceptable to the University

The Contractor will require every subcontractor to provide the name and location of the place of business of each Subcontractor and subordinate Subcontractor which will perform work or labor or render services for the Project.

2.04.3 Bidder's Security

All bids shall be presented under sealed cover and have enclosed an amount as directed in the instructions to bidders as bid security. The bid security may be a cashier's check made payable to Wayne State University or as otherwise directed in the instructions to bidders.

2.05 Bid Proposals

2.05.1 Submission of Proposals

Proposals shall be submitted to the office indicated on the bid proposal. It is the responsibility of the bidder to see that its bid is received in the proper time. Delays in timely receipt of the bid caused by the United States or the University mail system, independent carriers, acts of God, or any other cause shall not excuse late receipt of a bid. Any bid received after the scheduled closing time for receipt of bids shall not be considered and will be rejected by the University, opened, retained by the University or returned to the bidder unopened.

2.05.2 Withdrawal of Proposals

Any bid may be withdrawn at any time prior to the time fixed for receiving bids but only by a written request from the bidder or its authorized representative filed with the University. An oral, faxed, or telephonic request



to withdraw a bid proposal is not acceptable. The withdrawal of a bid shall not prejudice the right of a bidder to file a new bid. This paragraph does not authorize the withdrawal of any bid after the time fixed for receiving bids.

2.05.3 Public Opening of Proposals – SECTION DELETED

2.05.4 Rejection of Irregular Proposals

Proposals may be rejected if they show any alterations of forms, additions not called for, conditional bids, incomplete bids, erasures, or irregularities of any kind. If the bid amount is changed after the amount has been once inserted, the change shall be initialed.

2.05.5 Power of Attorney or Agent

When proposals are signed by an agent, a power of attorney shall either be on file with the University prior to the opening of bids or be submitted with the proposal. Failure to submit a power of attorney may result in the rejection of the proposal as irregular and unauthorized. A power of attorney is not necessary in the case of a general partner of a partnership.

2.05.6 Waiver of Irregularities/University's Right to Reject Bids

The University reserves the right to waive any or all irregularities in proposals submitted. The University reserves the right to reject any or all of the bids submitted.

2.05.7 Exclusion from Contract Documents

Nothing in any of the bidding documents, including but not limited to Request for Proposal form, Notice to Contractors, Proposal by Contractor and Design Professional and bids including any attachments or exhibits by Contractor, shall be considered part of the Contract Documents unless specifically incorporated.

2.06 Mistake in Bid

A bidder shall not be relieved of a bid nor shall any change be made in a bid because of mistakes without consent of the University. Failure by the Contractor to honor its proposal following the opening of bids for any reason shall result in the forfeiture of the Bid Security and possible suspension from future work consideration by and with the University.

2.07 Non-Discrimination

Wayne State University is an affirmative action/equal opportunity employer. The University has a strong commitment to the principle of diversity in all areas.

The Contractor and all Subcontractors shall not discriminate against any employee or applicant for employment because of race, color, religion, national origin, age, sex (including gender identity), height, weight or familial, disability or veteran status. The Contractor will ensure that applicants are employed and that employees are treated during employment, without regard to their race, color, religion, national origin, age, sex (including gender identity), height, weight or familial, disability, or veteran status. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor shall, in all solicitation or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without



regard to race, color, religion, national origin, age, (including gender identity), height, weight or familial, disability or veteran status.

The Contractor shall comply with all requirements of the Elliott-Larsen Civil Rights Act being 1976 PA 453, as amended.

The Contractor shall also comply with the Persons with Disabilities Civil Rights Act being 1976 PA 220, as amended.

The Contractor shall include, or incorporate by reference, the provisions of this Article 2.07 in each and every subcontract or purchase order and shall provide in each and every subcontract or purchase order that said provisions will be binding upon each and every subcontractor and Supplier and Vendor.

Any breach of the requirements and covenants of this Article 2.07 shall constitute a material breach of the Contract Documents.

3.00 AWARD AND EXECUTION OF CONTRACT

3.01 Contract Bonds and Insurance

3.01.1 Payment and Performance

The Contractor shall forward to the University fully executed Payment & Performance Bonds in the amount of 100 percent of the Contract value on the AIA Form 312 or an equivalent form that is acceptable to the University and in compliance with MCL 129.201 et seq. within five (5) days after execution of the Agreement.

In the same five (5) day period the Contractor shall present to the University, in an acceptable form, evidence of the insurance as required by the Contract Documents. Actual Work shall not commence until the bond and insurance is received by the University. Failure to provide the bond and insurance in the time-frame allowed shall not be cause for an extension of Contract Time.

All alterations, extensions of time, extra and additional work, and other changes authorized by any part of the Contract, including determinations made under Article 7.00, Claims and Disputes, shall be made without securing the consent of the surety or sureties on the Contract bonds.

Whenever the University has cause to believe that the surety has become insufficient, the University may demand in writing that the Contractor provide such further bonds or additional surety, not exceeding that originally required, as in the University's opinion is necessary, considering the extent of the work remaining to be done. Thereafter no payment shall be made to the Contractor or any assignee of the Contractor until the further bonds or additional surety have been furnished.

Contract bonds shall remain in full force and effect during the repair and guarantee period required by the Contract Documents.

3.02 Execution of Contract

The Contract shall be signed by the Contractor in three (3) duplicate counterparts and returned to the University within five days of receipt from the University, not including Saturdays, Sundays, or legal holidays. No Contract shall be binding upon the University until it has been executed by the Contractor and a University official in accordance with the Authorization Matrix.

3.03 Failure or Refusal to Execute Contract

Failure or refusal by the Contractor to execute the Contract within the time set in Section 3.02 shall be just cause for the rescission of the award and the forfeiture of bidder's security. Failure or refusal to file acceptable bonds within the time set in Section 3.01 constitutes a failure or refusal to execute the Contract. If the Contractor fails or refuses to execute the Contract, the University may award the Contract to another contractor and the Contractor shall forfeit his Cashier's Check.

4.00 RESPONSIBILITIES OF THE PARTIES

4.01 University

4.01.1 Information and Services Required of the University

The University shall make available existing surveys describing physical characteristics, legal limitations and utility locations for the site of the Project. The University does not warrant or guarantee the accuracy of the information provided.

Unless otherwise agreed to, the University shall be responsible for the abatement of asbestos containing materials and/or site related environmental hazards. The University will provide documentation regarding the presence of asbestos containing materials or other possible environmental hazards to the Contractor. Second opinions on previously documented clean conditions shall be provided at the Contractor's expense. Positive results regarding environmental hazards shall become the University's obligation. If, during the execution of the Work, previously unknown environmental hazards are encountered, the University shall be allowed a reasonable amount of time to abate environmental hazards.

The University shall provide available information regarding requirements for the Project including plans and specifications for the buildings and a survey of the site where required. The Contractor shall review the plans and specifications and survey, if provided, for errors, inconsistencies, ambiguities or omissions as required by Article 4.02.2, Review of Contract Documents and Field Conditions by Contractor. In the event errors, inconsistencies, ambiguities or omissions in the plans, drawings, and specifications were not reasonably identifiable in the Contractor's review as specified in Article 4.02.2, Review of Contract Documents and Field Conditions by Contractor, and such errors, inconsistencies, ambiguities or omissions result in changes in time and cost, the University may make reasonable adjustment in the Contract Sum in accordance with Article 6.00, CHANGES IN THE WORK of the General Conditions.

Except for permits and fees, which are the responsibility of the Contractor under the Contract Documents, the University 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.

Information or services under the University's control shall be furnished by the University with reasonable promptness to avoid delay in orderly progress of the Work.

All reproduction required for construction is the obligation of the Contractor.

4.01.2 University's Right to Stop the Work



If, in the University's determination, the Contractor fails to correct work which is not in accordance with the requirements of the Contract Documents as required, or persistently fails to carry out work in accordance with the Contract Documents, the University Representative, by written order may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the University to stop the Work shall not give rise to a duty on the part of the University to exercise this right for the benefit of the Contractor or any other person or entity.

It is understood that while the Contractor is fully responsible for the safety of the jobsite, and for the methods of its execution, if the University deems that the Contractor is failing to provide safe conditions, the University may stop or restrict the Work under such conditions. However, this right shall not create such duty on the University. Under no circumstance shall the Contractor be granted a time extension or Contract Sum increase for conditions resulting by a stop work order occurring as a consequence of the Contractor's failure to maintain safe working conditions.

4.01.3 University's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a three (3) day period after receipt of written notice from the University to commence and continue correction of such default or neglect with diligence and promptness, the University may after such three (3) day period, without prejudice to other remedies the University 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 cost of correcting such deficiencies, including compensation for the Design Professional's additional services and expenses made necessary by such default, neglect or failure. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the University.

4.01.4 University's Right to Audit

4.01.4.1

Contractor's records, which shall include but not be limited to accounting records (hard copy, as well as computer readable data if it can be made available), written policies and procedures; subcontract files (including proposals of successful and unsuccessful bidders, bid recaps, etc.); original estimates; estimating work sheets, correspondence; change order files (including documentation covering negotiated settlements); backcharge logs and supporting documentation; general ledger entries detailing cash and trade discounts earned, insurance rebates and dividends; and any other supporting evidence deemed necessary by the University to substantiate changes related to the Agreement (collectively referred to as "Records") shall be maintained in accordance with Generally Accepted Accounting Principles and open to inspection and subject to audit and/or reproduction by University's agent or its authorized representative to the extent necessary to adequately permit evaluation and verification of Cost of the Work, and any invoices, change order, payments or claims submitted by the Contractor or any of his payees pursuant to the execution of the contract that are or have been charged on a basis other than a lump sum approved in writing by the University.

4.01.4.2

Such audits may require inspection and copying from time to time and at reasonable times and places of any and all information, materials and data of every kind and character, including without limitation, records, books, papers, documents, subscriptions, recordings, agreements, purchase order, leases, contracts, commitments, arrangements, notes, daily diaries, superintendent reports, drawings, receipts, vouchers and memoranda, and any and all other agreements, sources of information and matters that



may in University's judgment have any bearing on or pertain to any matters, rights, duties or obligations under or covered by any Contract Documents. Such records subject to audit shall also include, but not be limited to, those records necessary to evaluate and verify direct and indirect costs, (including overhead allocations) as they may apply to costs associated with this Agreement.

4.01.4.3

The University or its designee shall be afforded access to all of the Contractor's Records, and shall be allowed to interview any of the Contractor's employees, pursuant to the provisions of this article throughout the term of this contract and for a period of five (5) years after Final Payment or longer if required by law. To the extent feasible, the Construction Manager's records shall remain confidential, and the University's third party auditors will enter into a confidentiality agreement between and among the University, the third-party auditor and the Contractor prior to any audits being conducted.

4.01.4.4

Contractor shall require all Subcontractors and material suppliers (payees) to comply with the provisions of this article by insertion of the requirements hereof in a written agreement between Contractor and payee so as to allow the University to verify any amounts charged to the Project by a payee on a basis other than a lump sum approved in writing by the University. Such requirements will also apply to Subcontractors and all lower tier Subcontractors. Contractor shall cooperate fully and shall cause all of Contractor's Subcontractors to cooperate fully by furnishing or making available to University from time to time whenever requested in an expeditious manner any and all such information, materials and data.

4.01.4.5

University's agent or its authorized representative shall have access to the Contractor's facilities, shall have access to all necessary records; and shall be provided adequate and appropriate work space, in order to conduct audits in compliance with this article.

4.01.4.6

Contractor agrees that University's designee shall have the right to examine the Contractor's records (during the contract period and up to five (5) years after Final Payment is made on the contract) to verify the accuracy and appropriateness of the pricing data used to price change proposals or claims. Contractor agrees that if the University determines the cost and pricing data submitted (whether approved or not) was inaccurate, incomplete, not current or not in compliance with the terms of the contract regarding pricing of change orders, an appropriate contract price reduction will be made. Such post-approval contract price adjustments will apply to all levels of contractors and/or subcontractors and to all types of change order proposals specifically including lump sum change orders, unit price change orders and cost-plus change orders.

4.01.4.7

If an audit, inspection or examination in accordance with this article, discloses overcharges (of any nature) by the Contractor to the University in excess of five percent (5%) of the total contract billings, the actual cost of the University's audit shall be reimbursed to the University by the Contractor. Any adjustments and/or payments which must be made as a result of any such audit or inspection of the



Contractor's invoices and/or records shall be made within a reasonable amount of time (not to exceed 90 days) from presentation of University's findings to Contractor.

4.02 Contractor

The Contractor recognizes the relationship of trust and confidence established between the University and the Contractor by this Contract. The Contractor shall furnish the University with its best skill and judgment and fully cooperate with the University in furthering its best interests. All the Work is to be done in the best manner by persons skilled in the type of Work to be performed.

4.02.1 Contractor's Responsibility for the Work

The Contractor shall be responsible to the University for all Work performed under this Contract. For purposes of assessing responsibility to the Contractor by the University, all persons engaged in the Work shall be considered employees of the Contractor. The Contractor shall give its personal attention to the fulfillment of the Contract and keep all phases of the Work under its control.

4.02.2 Review of Contract Documents and Field Conditions by Contractor

The Contractor shall have a continuing duty to read, carefully study and compare the Contract Documents as defined in Article 1.00, DEFINITIONS, and product data with each other and with information furnished by the University. The Contractor shall perform construction coordination and constructability review of the Contract Documents and shall at once report to the Design Professional and the University, any errors, inconsistencies, ambiguities and omissions before proceeding with the affected Work. The Contractor shall be liable to the University for damage resulting from the Contractor's failure to properly perform such reviews or failure to promptly report any errors, inconsistencies, ambiguities or omissions identified in the Contract Documents to the Design Professional and the University. If the Contractor performs any construction activity that involves such error, inconsistency, ambiguity or omission in the Contract Documents without such notice to the Design Professional and the University, the Contractor shall assume responsibility for such performance and shall bear all costs attributable for correction. If the Contractor submits authorized substitutes that cost in excess of the Contract Sum or which cause coordination conflicts, the Contractor shall bear all costs attributable to correction.

The Contractor shall perform the Work in accordance with the Contract Documents.

The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Documents before commencing activities. Errors, inconsistencies or omissions discovered shall be reported to the Design Professional and University at once.

4.02.3 Supervision and Construction Procedures

The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible to the University for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless Contract Documents give other specific instructions concerning these matters.

The Contractor shall be responsible to the University for acts and omissions of the Contractor's employees, subcontractors and their agents and employees, and other persons performing portions of the Work under a Contract with the Contractor.



The Contractor agrees to furnish efficient business administration, coordination, supervision and superintendence of the Work and to furnish at all times a competent and adequate administrative and supervisory staff and an adequate supply of workmen and materials to perform the Work in the best and most sound way in the most expeditious and economical manner consistent with the interests of the University. The Contractor agrees from time to time at the University's request to furnish estimates and technical advice as to construction methods and equipment to the University and Design Professional.

The Contractor agrees to cooperate with the Design Professional, University's Representative, commissioning agents, and all persons or entities retained by the University to provide consultation and advice, and to coordinate the Work with the Work of such parties so that the Project shall be completed in the most efficient and expeditious manner. In the event that Contractor's failure to efficiently sequence or coordinate the Work results in additional costs to the University, the Contractor shall promptly reimburse the University for the actual costs incurred. Contractor shall remain responsible for any delays resulting from its failure to efficiently coordinate and schedule the Work; any delays or extensions shall be addressed as provided in Sections 4.08, 4.09 and 4.10 of these General Conditions.

4.02.4 Quality Control

The Contractor shall be fully responsible for the quality of materials and workers' skill in the Project. The Contractor shall not rely upon the inspection and testing provided by the University or Design Professional other than those special inspections and tests performed at the University's direction for which there are written reports. Reports issued by the University's commissioning agent are to be considered complementary in nature and in no way relieve the Contractor of its responsibility to deliver Work in compliance with the Contract Documents.

The Contractor shall inspect the Work of the subcontractors on the Project, while the Work is being performed through final completion and acceptance of the Project by the University to assure that the Work performed and the materials furnished are in strict accordance with the drawings and specifications; the Contractor shall also inspect the Work to verify that Work on the Project is progressing on schedule.

The Contractor shall be responsible for inspection of portions of Work performed under this Contract to determine that such portions are in proper condition to receive subsequent Work. In the event that it becomes necessary to interpret the meaning and intent of the plans and specifications during construction and the meaning is not reasonably inferable, the Contractor shall submit as a Request for Information (RFI) to the Design Professional to make the interpretation in writing and transmit same to appropriate Subcontractors and the University in accordance with the procedures established in section 5.02 of these General Conditions.

The Contractor shall not be relieved of obligations to performing the Work in accordance with the Contract Documents either by activities or duties of the Design Professional in the Design Professional's administration of the Contract, or by tests, inspections or approvals required or performed by persons other than the Contractor.

4.02.5 Labor and Materials

The Contractor shall provide an analysis of the types and quantity of labor required for the Project and review the availability of the appropriate categories of labor required for all Work, and the Contractor shall be responsible to provide the necessary and adequate labor needed to complete the Project by the Contract Time. During the course of the Project, the Contractor shall endeavor to maintain harmonious labor relations on the Project.

Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, , 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.

Unless otherwise noted in the Information to Bidders, the Contractor shall provide and pay for water, heat, electric and other utilities.

The Contractor shall enforce strict discipline and good order among the Contractor's employees and Subcontractors and others carrying out the Work of the Contract. The Contractor shall not permit employment of unsafe persons or persons not skilled in tasks assigned to them.

4.02.6 Disputes with Subcontractors

Wherever any provision of any section of the Plans and Specifications conflicts with any agreement or regulation of any kind at any time in force among members of any Trade Associations, Unions or Councils which regulate or distinguish what Work shall or shall not be included in the Work of any particular trade, the Contractor shall make all necessary arrangements to reconcile any such conflict without delay, damage, increase to the Contract Sum or recourse to the University. The University will not arbitrate disputes among subcontractors nor between the Contractor and one or more subcontractors concerning responsibility for performing any part of the Project.

In case the progress of the Work is affected by any undue delay in furnishing or installing any items of material or equipment required under the Contract Documents because of conflict involving any agreement or regulation of the type described above, the University's Representative may require that other material or equipment of equal kind and quality be provided at no additional cost to the University.

4.02.7 Project Manager and Superintendent

The Contractor shall have at the Project site, during the full term of the Contract, an approved, competent project staff, which may include a Project Manager and Superintendent, and any necessary assistants, all satisfactory to the University's Representative and in accordance with the Contract Documents and the Contractor's Staffing Plan. The Project Manager or the Superintendent shall not be changed, except with the written consent of the University's Representative unless the Project Manager or the Superintendent ceases to be in the employ of the Contractor. The Project Manager or the Superintendent shall represent the Contractor and all directions given to either of them by the University or the University's Representative shall be as binding as if given to the Contractor. All directions and communications shall be confirmed in writing.

If a Project Manager or a Superintendent approved by the University's Representative ceases to be in the Contractor's employ, the Contractor shall immediately replace him with a person acceptable to the University's Representative. The University in its sole discretion shall have the right to require the removal of any agent or employee of the Contractor or any subcontractor without cause at any time.

4.02.8 Taxes

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

4.02.9 Permits and Notices

The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations, policies and lawful orders of public authorities and the University bearing on performance of the Work.



4.02.10 Allowances

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such stated amounts including identified unit cost, but the Contractor shall not be required to employ persons or entities against which the Contractor makes reasonable objection. Unless otherwise provided in the Contract Documents:

1. materials and equipment under an allowance shall be selected promptly by the University to avoid delay in the Work;
2. allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
3. the 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 allowances;
4. if allowance assumptions prove inappropriate, the Contract Sum may be adjusted accordingly by Change Order. The amount of the Change Order shall reflect the difference between actual costs and the allowances.

4.02.11 Use of Site

The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with materials or equipment. The site shall be safely maintained and kept clean, orderly and neat.

4.02.12 Safety

The Contractor shall protect adjoining property and nearby buildings, roads, and other facilities and improvements from dust, dirt, debris and other nuisances arising out of Contractor's operations or storing practices. Dust shall be controlled by sprinkling, misting or other effective methods acceptable to University and in accordance with legal requirements. An erosion and sedimentation control program shall be initiated, which includes measures addressing erosion caused by wind and water and sediment in runoff from site. A regular watering program shall be initiated to adequately control the amount of fugitive dust.

The Contractor is knowledgeable of and understands that the University may intend to maintain occupancy of certain portions of the existing facility. The Contractor shall exercise caution at all times for the protection of persons and their property. The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to: (1) employees on the Work site together with Subcontractors and other persons who may be affected thereby; (2) the Work and materials and equipment to be incorporated therein, whether in storage on or offsite, 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. The Contractor shall install adequate safety guards and protective devices for all equipment and machinery, whether used in the Work or permanently installed as part of the Project.

The Contractor shall also provide and adequately maintain all proper temporary walks, roads, guards, railings, lights, and warning signs. The Contractor shall comply with all applicable laws relating to safety precautions. The Contractor shall establish and maintain and update as required a Project Specific Safety Program.



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 University and Design Professional.

The Contractor shall require each and every one of its subcontractors and Trade Contractors to comply with all of the provisions of this section.

The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.

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 the Contract.

4.02.13 Hazardous Condition

The University and/or the Design Professional may bring to the attention of the Contractor a possible hazardous situation in the field regarding the safety of personnel on the site. The Contractor shall be responsible for verifying that all local, state, and federal workplace safety guidelines are being observed. In no case shall this right to notify the Contractor absolve the Contractor of its responsibility for monitoring safety conditions. Such notification shall not imply that anyone other than the Contractor has assumed any responsibility for field safety operations.

Explosives shall not be used without first obtaining written permission from the University and then shall be used only with the utmost care and within the limitations set in the written permission and in accordance with prudence and safety standards required by law. Storage of explosives on the Project site or University is prohibited. Powder activated tools are not explosive for purposes of this Article; however, such tools shall only be used in conformance with State safety regulations.

The Contractor shall report in writing to the University's Representative, within eight (8) hours, all accidents whatsoever arising out of, or in connection with, the performance of the Work, whether occurring on or off the Site, which caused death, personal injury or property damage, giving full details and statements of witnesses. In addition, if death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to the University Representative and the University Police at (313) 577-2222. If any claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall report promptly the facts in writing to the University's Representative, giving full details of the claim.

4.02.14 Cutting, Patching and Sequencing

The Contractor shall be responsible for all cutting, fitting or patching required to complete the Work and to ensure the complete and effective coordination of the Work.

The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the University 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 University or a separate Contractor except with written consent of the University and of such separate Contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the University or a separate Contractor the Contractor's consent to cutting or otherwise altering the Work.

4.02.15 Access to Site



The Contractor shall at all times permit the University and the Design Professional to visit and observe the Work, and the shops where Work is in preparation, and shall maintain proper facilities and provide safe access for such observation. Work requiring testing, observation or verification shall not be covered up without such test, observation, or approval. Appropriate advance coordination of such testing, observation or verification is expected. University must provide prior written approval for any work to be performed on a Saturday, Sunday, or holiday. In the event that Contractor desires to perform Work on a weekend or holiday, Contractor shall provide a minimum of 48 hours written notice to the University of such desire prior to performing such Work. However, if the Work involves an actual or potential interruption to a utility or service, the Contractor shall provide no less than seven (7) days' written notice to the University.

The Contractor acknowledges that during the performance of the Work, the affected building and surrounding campus buildings will remain occupied and will require access by the public. The Contractor further acknowledges that other Contractors will be working on or near the Project site to accomplish the University's purposes and projects. To the greatest extent possible, the Contractor shall cooperate fully with the University and its guests, students, employees, invitees, and other Contractors in performing the Work required under the Contract. The Contract Sum includes any and all reasonably necessary costs expended to minimize interference with the University's activities as well as to coordinate schedules with other contractors' projects as required by the University.

4.02.16 Burden for Damage

From the issuance of the official Notice to Proceed until the formal acceptance of the Project by the University, the Contractor shall have the charge and care of and shall bear all risk of damage to the Project and materials and equipment for the Project other than damage directly caused by the University or the University's other contractors.

4.02.17 Payments by Contractor

The Contractor agrees to promptly pay all subcontractors upon receipt of each progress payment, unless otherwise agreed in writing by the parties, the respective amounts allowed Contractor on account of the Work performed by its subcontractors to the extent of each such subcontractor's interest therein.

In the event the University becomes informed that the Contractor has not paid a subcontractor as herein provided, the University shall have the right, but not the duty, to issue future checks in payment to the Contractor of amounts otherwise due hereunder naming the Contractor and such subcontractor as joint payees. Such joint check procedure, if employed by the University, shall create no rights in favor of any person or entity beyond the right of the named payees to payment of the check and shall not be deemed to commit or obligate the University to repeat the procedure in the future. This provision shall not supersede the procedures set forth in Article 8.00 of these General Conditions.

4.02.18 Responsibility to Secure and Pay for Permits, Licenses, Utility Connections, Etc.

The Contractor shall secure all permits and licenses required for any operations required under this Contract and shall pay all costs relating thereto as well as all other fees and charges that are required by the United States, the State, the county, the city, a public utility, telephone company, special district, or quasi-governmental entity. It is the responsibility of the Contractor to ascertain the necessity of such permits and licenses in preparing its bid, Contract Sum and include in its bid, Contract Sum the cost thereof, as well as any time requirements for securing such permits and licenses.

4.02.19 Patented or Copyrighted Materials



The Contractor shall pay all royalties and license fees for the use of patented or copyrighted processes or materials. The Contractor shall defend suits or claims for infringement of patent rights and shall hold the University and Design Professional 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. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Design Professional and University in writing.

4.02.20 Property Rights in Materials and Equipment

Nothing in the Contract shall be construed as vesting in the Contractor any property right in the materials or equipment after the materials or equipment have been attached to or permanently placed in or upon the Work or the soil or after payment has been made for fifty percent or more of the value of the materials or equipment delivered to the site of the Work whether or not they have been so attached or placed. All such materials or equipment shall become the property of University upon being so attached or placed, or upon payment of fifty percent or more of the value of the materials or equipment delivered on the site but not yet installed and the Contractor warrants that all such property shall pass to the University free and clear of all liens, claims, security interests, or encumbrances.

4.02.21 Utilities

The Contractor shall refer to and abide by the policies included in the Supplementary General Conditions and shall provide the notices as required by University's Utility Disturbance and Interruption Request form.

The Contractor shall provide as-built drawings of all utilities encountered and constructed for the University, indicating the size, horizontal location, and vertical location based on the Project bench mark or a stable datum.

Unless otherwise specifically stated, the Contractor shall provide or otherwise make all arrangements for utilities required to deliver the Work. .

4.02.22 Asbestos and Hazardous Materials

The Contractor is prohibited from installing any asbestos containing materials or products, and other prohibited and hazardous materials in the Work. The Contractor shall be responsible for removal and replacement costs should it be determined this provision has been violated, regardless of whether the job has been completed.

4.02.23 Photographic Site Survey

Contractor shall perform a photographic survey of construction site and adjoining structures prior to commencing Work. The survey shall be provided to the University and shall include photographs of pathways, flat concrete paving, foundations, walls, landscaping.

4.02.24 Compliance with University Policies on Drugs, Alcohol and Tobacco.

The University requires Contractors, Subcontractors and sub-subcontractors with access to the work site to abide by the University's policies on drugs, alcohol and tobacco, which can be found at: http://bog.wayne.edu/2_20_04.php and <http://policies.wayne.edu/administrative/00-03-smoke-free-campus.php>. All costs for initial and period testing shall be borne by the Contractor

1. The Contractor and University shall reserve the right to test any and/or all site personnel at random periods and without notice.



- a. The Contractor shall be responsible for all costs including wages for those individuals testing drug or alcohol-free at the Contractor's direction.
 - b. Subcontractors shall be responsible for all costs including wages for those individuals not testing drug or alcohol-free at the direction of the Contractor, and the Subcontractor shall immediately remove those individuals from the site.
2. Any individual not testing drug or alcohol-free shall not be allowed to return to the site under any circumstances.

4.03 Design Professional

4.03.1 Design Professional's Administration of Contract

The Design Professional will provide one or more Project Representatives to assist in the administration of the Contract as described in the Contract Documents, and to assist the University's Representative (1) during the construction, (2) until final payment is due and (3) with the University's concurrence, from time to time during the correction and warranty period. The Design Professional will advise and consult with the University on issues relating to contract performance and interpretation. The Design Professional will have no authority to act on behalf of the University except as provided in the Contract Documents, unless otherwise modified by written instrument in accordance with other provisions of the Contract.

The Design Professional will visit the site at intervals defined in the Design Professional's Proposal to become familiar with the progress and quality of the completed Work and to determine if the Work is being performed in a manner indicating that the Work, when completed, will be in accordance with the Contract Documents. On the basis of on-site observations, the Design Professional will keep the University and Contractor informed of progress of the Work by written field reports, and will endeavor to guard the University against defects and deficiencies in the Work.

The Design Professional will not have control over or charge of and will not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's responsibility. The Design Professional will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Design Professional 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 of any other persons performing portions of the Work.

4.03.2 Communications Facilitating Contract Administration

The Design Professional and Contractor shall communicate directly concerning the Project and shall keep the University advised of their communications. Communications by and with the Design Professional's consultants shall be through the Design Professional. Communications by and with subcontractors and material suppliers shall be through the Contractor. Communications by and with separate Contractors shall be through the University.

4.03.3 Evaluation of Applications for Payment

Based on the Design Professional's observations and evaluations of the Contractor's Applications for Payment, the Design Professional must approve and sign any Contractor Applications for Payment as an



express condition precedent to release of any progress or final payment. In the absence of Design Professional, the University will review and authorize applications for payment.

The Design Professional will have authority to reject Work which does not conform to the Contract Documents. Whenever the Design Professional considers it necessary or advisable for implementation of the intent of the Contract Documents, the Design Professional will have authority to require additional observation or testing of the Work in accordance with section 5.06, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Design Professional 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 Design Professional to the Contractor, subcontractors, material and equipment suppliers, their agents or employees, or other persons performing portions of the Work.

4.03.4 Review of Shop Drawings, Product Data and Samples

The Design Professional shall review and approve or take other appropriate action upon the Contractor's submittal of Shop Drawings, Product Data and Samples. The Design Professional's action will be taken within 10 days from receipt so as not to cause delay in the Work or in the activities of the University, Contractor or separate Contractors, while allowing sufficient time in the Design Professional's professional judgment to permit adequate review. Review of such submittal 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 Design Professional's review of the Contractor's submittal shall not relieve the Contractor of the obligations under Article 5.04. The Design Professional's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Design Professional, of any construction means, methods, techniques, sequences or procedures. The Design Professional's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

4.03.5 Site Observations to Determine Substantial and Final Completion

The Design Professional will conduct observations to determine the date or dates of Substantial Completion and the date of Final Completion, will receive and forward to the University for the University's review and retention all written warranties and related documents required by the Contract and assembled by the Contractor, and will issue an approval of final payment upon compliance with the requirements of the Contract Documents.

4.04 Delegation of Performance and Assignment of Money Earned

The performance of all or any part of this Contract may not be delegated by the Contractor or Design Professional without the written consent of the University. Consent will not be given to any proposed delegation which would relieve the Design Professional, the Contractor or its surety of their responsibilities under the Contract.

The Contractor may assign moneys due or to become due under the Contract, only upon written consent of the University. Assignments of moneys earned by the Contractor shall be subject to proper retention in favor of the University and to all deductions provided for in the Contract and such moneys shall be subject to being used by the University for the completion of the Work in the event the Contractor is in default. Any assignment attempted without the written consent of the University shall be void.

4.05 Contractor's Insurance



The Contractor shall not commence Work under this Contract until it has obtained all the insurance required by the Contract Documents and such insurance has been approved by the University; likewise, no subcontractor or subconsultant shall be allowed to commence Work until the insurance required has been obtained. The Contractor shall, at its expense, purchase and maintain in full force and effect such insurance as will protect itself and the University from claims, such as for bodily injury, death, and property damage, which may arise out of or result from the Work required by the Contract Documents, whether such Work is done by the Contractor, by any subcontractor, by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable. The types of such insurance and any additional insurance requirements are specified herein with the amounts and limits set forth in the Supplementary General Conditions.

4.05.1 Policies and Coverage

The following policies and coverages shall be furnished by the Contractor:

- (1) Comprehensive or Commercial Form General Liability Insurance on an "Occurrence" form covering all Work done by or on behalf of the Contractor and providing insurance for bodily injury, personal injury, property damage, and Contractual liability. Except with respect to bodily injury and property damage included within the products and completed operations hazards, the aggregate limit shall apply separately to work required of the Contractor by these Contract Documents. This insurance shall include the contractual obligations assumed under the Contract Documents and specifically section 4.06.
- (2) Business Automobile Liability Insurance on an "Occurrence" form covering owned, hired, leased, and non-owned automobiles used by or on behalf of the Contractor and providing insurance for bodily injury, property damage, and Contractual liability.
- (3) Worker's Compensation and Employer's Liability Insurance as required by Federal and Michigan law. The Contractor shall also require all of its Subcontractors to maintain this insurance coverage. The Contractor acknowledges and shall abide by the University's prohibition on the use of 1099 independent contractors and owner/operator business entities wherein such individuals are not able to secure and maintain such insurance. The Contractor shall ensure that all classifications of laborers and construction mechanics performing Work on the Project job site are traditional employees of the Contractor or any Trade Contractor for any tier thereof, and that each is covered by such insurance.
- (4) The Umbrella Excess Liability insurance must be consistent with and follow the form of the primary policies, except that Umbrella Excess Liability insurance shall not be required for the Medical Expense Limit.
- (5) Builder's Risk Insurance: The Contractor, at his sole expense, shall purchase and maintain property insurance upon the entire Project for the full replacement cost at the time of any loss. This insurance shall include "All Risk" coverage against physical loss or damage including the perils of Fire and Extended Coverage, Theft, Vandalism, and Malicious Mischief, Transit and Collapse. The Contractor will be responsible for any co-insurance penalties and/or deductibles.
- (6) Professional Liability (Errors and Omissions) including tail-coverage for claims made after final completion.

4.05.2 Proof of Coverage

Certificates of Insurance or Declarations pages as may be requested by the University, as evidence of the insurance required by these Contract Documents, shall be submitted by the Contractor to the University. The



Certificates of Insurance and Declarations shall state the scope of coverage and deductible, and list the University as an additional insured as required by Section 4.05.04 below. Any deductible shall be the Contractor's liability. The Declarations shall provide for no cancellation or modification of coverage without thirty (30) days prior written notice to the University. Acceptance of Certificates of Insurance or Declarations pages by the University shall not in any way limit the Contractor's liabilities under the Contract Documents. The Contractor shall maintain required insurance for the entire duration of the Contract. In the event the Contractor does not comply with these insurance requirements, the University may, at its option, provide insurance coverage to protect the University; the cost of such insurance shall be deducted from the Contract Sum or otherwise paid by the Contractor. Renewal certifications shall be filed in a timely manner for all coverage until the Project is accepted as complete as requested by the University. Upon the University's request, the Contractor shall provide copies of the policies obtained from the insurers.

4.05.3 Subcontractor's Insurance

The Contractor shall either require Subcontractors to carry insurance as set forth in the CCIP Insurance Manual and the Subcontract, or the Contractor shall insure the activities of the Subcontractors in the amount, types and form of insurance required under by the Contract Documents. If the Contractor elects to have its Subcontractors purchase individual insurance policies, the Contractor shall cause its trade contracts and subcontracts to include a clause requiring that copies of any insurance policies which provide coverage to the Work shall be furnished to the University upon request. The Contractor shall supply the University with a list of all Subcontractors, including those enrolled in the CCIP coverage, and copies of the enrolled Subcontractors' certificates of insurance evidencing coverage, showing whether or not they have individual insurance policies and certifying that those subcontractors without individual insurance policies are insured by the Contractor.

4.05.4 Scope of Insurance Coverage

The Contractor's insurance as required by the Contract Documents (including subcontractors' insurance), by endorsement to the policies and the Certificates of Insurance, shall include the following and may be presented in the form of a rider attached to the Certificates of Insurance:

- (1) The Board of Governors of Wayne State University, the University, their officers, employees, representatives and agents including the Design Professional, shall be included as additional insured under the general liability, builder's risk and automobile liability policies for and relating to the Work to be performed by the Contractor and subcontractors. This shall apply to all claims, costs, injuries, or damages.
- (2) A Severability of Interest Clause stating that, "The term 'insured' is hereby used severally and not collectively, but the inclusion herein of more than one insured shall not operate to increase the limits of the insurer's or insurers' liability."
- (3) A Cross Liability Clause stating that, "In the event of claims being made under any of the coverages of the policy or policies referred to herein by one or more insured hereunder for which another or other insured hereunder may be liable, then the policy or policies shall cover such insured or insured against whom a claim is made or may be made in the same manner as if separate policies had been issued to each insured hereunder. Nothing contained herein, however, shall operate to increase the insurer's limits of liability as set forth in the insuring agreements."
- (4) The Board of Governors of Wayne State University, the University, their officers, employees, representatives and agents, shall not by reason of their inclusion as insured incur liability to the insurance carriers for payment of premiums for such insurance. However, the Board of Governors of Wayne State University may, in their sole discretion after receiving a notice of cancellation for



nonpayment, elect to pay the premium due and deduct such payment from any sums due to the Contractor or recover the amount paid from the Contractor if the sums remaining are insufficient.

- (5) Coverage provided is primary and is not in excess of or contributing with any insurance or self-insurance maintained by the Board of Governors of Wayne State University, the University, their officers, employees, representatives and agents.

4.05.5 Miscellaneous Insurance Provisions

The form and substance of all insurance policies required to be obtained by the Contractor shall be subject to approval by the University. All such policies shall be issued by companies lawfully authorized to do business in Michigan and be acceptable to the University. All property insurance policies to be obtained by the Contractor shall name the University as loss payee as its interest, from time to time, may appear.

The Contractor shall, by mutual agreement with the University and at the University's cost, furnish any additional insurance as may be required by the University. The Contractor shall provide Certificates of Insurance evidencing such additional insurance.

Should the Project involve asbestos abatement, the Contractor or subcontractor, as appropriate, shall provide asbestos liability insurance.

The Contractor acknowledges that the University is self-insured and participates in the Michigan Universities Self-Insurance Corporation program and the Contractor agrees that the University is not required to provide or purchase any additional insurance with respect to this Project or the Work required by the Contractor for the Project.

4.05.6 Loss Adjustment

Any insured loss is to be adjusted with the Contractor and made payable jointly to the University and the Contractor. The Contractor shall cooperate with the University in a determination of the actual cash value or replacement value of any insured loss. Any deductible amount shall be the responsibility of the Contractor.

4.05.7 Compensation Distribution

The University upon the occurrence of an insured loss shall account for any money so received and shall distribute it in accordance with such agreement as the interested parties may reach. Claim payments received shall be distributed proportionately according to the actual percentages of losses to both. If after such loss no other special agreement is made, replacement of damaged work shall be covered by an appropriate contract change order. Any dispute shall be resolved by the University.

4.05.8 Waivers of Subrogation

The University and Contractor waive all rights against (1) each other and any of their subcontractors, subcontractors, agents and employees, each of the other, and (2) the Design Professional, Design Professional's consultants, separate Contractors if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to this paragraph or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the University as fiduciary. The University or Contractor, as appropriate, shall require of the Design Professional, Design Professional's consultants, separate Contractors, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other 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.

4.06 Indemnification

4.06.1

To the fullest extent permitted by law, the Contractor shall hold harmless, defend, and indemnify the Board of Governors of Wayne State University, the University, and officers, employees, representatives and agents of each of them, from and against any and all claims or losses arising out of or are alleged to be resulting from, or relating to (1) the failure of the Contractor to perform its obligations under the Contract or the performance of its obligation in a willful or negligent manner; (2) the inaccuracy of any representation or warranty by the Contractor given in accordance with or contained in the Contract Documents; and (3) any claim of damage or loss by any subcontractor, or supplier, or laborer against the University arising out of any alleged act or omission of the Contractor or any other subcontractor, or anyone directly or indirectly employed by the Contractor or any subcontractor.

4.06.2

To the fullest extent permitted by law, the Contractor shall be liable for and hereby agrees to defend, discharge, fully indemnify and hold the University harmless from and against any and all claims, demands, damages, liability, actions, causes of action, losses, judgments, costs and expenses of every nature (including investigation costs and/or expenses, settlement costs, and attorney fees and expenses incident thereto) sustained by or asserted against the University arising out of, resulting from, or attributable to the performance or nonperformance of any Work and/or obligation covered by the Contract or to be undertaken in connection with the construction of the Project contemplated by the Contract (collectively, "Claim"), including, but not limited to, any Claim for: (a) any personal or bodily injury, illness or disease, including death at any time resulting therefrom of any person, (including, but not limited to, employees of the University, the Contractor, any subcontractor, and any materialman and the general public); (b) any loss, damage or destruction of any property; (c) any loss or damage to the University's operations, arising out of, resulting from, or attributable in whole or in part to (i) any negligence or other act or omission of the Contractor, and any subcontractor, any materialman and/or any other person or any of the directors, officers, employees or agents of any of them or (ii) any defects in material or equipment furnished hereunder; (d) any payments allegedly owed to subcontractors, sub-subcontractors or materialmen; (e) any acts or omissions relative to conditions of safety and protection of persons on the Project site; and/or (f) any act or omission relative to the Contractor's breach of obligations and regarding non-discrimination as set forth in these General Conditions. The Contractor shall not be liable hereunder to indemnify the University against liability for damages arising out of bodily injury to persons or damage to property caused by or resulting from the sole negligence or willful misconduct of the University, its agents or employees. The Contractor, at its own cost and expense, shall take out and maintain at all times during the effective period of the Contract, contractual liability insurance insuring the performance by the Contractor of its contractual duties and obligations under this Article, which insurance shall name the University as additional insured and shall be in form and amount and from an insurance company satisfactory to the University. The Contractor's duty to fully indemnify the University shall not be limited in any way by the existence of this insurance coverage.

4.06.3

The Contractor shall also be liable for and hereby agrees to pay, reimburse, fully indemnify and hold the University harmless from and against all costs and expenses of every nature (including attorney fees and



expenses incident thereto) incurred by the University in collecting the amounts due from the Contractor, or otherwise enforcing its rights, under the indemnifications described in this Article.

4.06.4

In claims against any person or entity indemnified under this Article made by an employee of the Contractor or a subcontractor, or indirectly employed by either of them, or anyone for whose acts either made by liable, the indemnification obligation under this Article shall not be limited by any limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a subcontractor under workers compensation laws, disability benefit laws, or other laws providing employee benefits.

4.06.5

The indemnification obligations under this Article shall not be limited by any assertion or finding that the person or entity indemnified is liable by reason of a non-delegable duty.

4.06.6

The Contractor shall hold harmless, defend, and indemnify the University from and against losses resulting from any claim of damage made by any separate Contractor of the University against the University arising out of any alleged acts or omissions of the Contractor, a subcontractor, anyone directly or indirectly employed by either the Contractor or subcontractor, or anyone for whose acts either the Contractor or subcontractor may be liable.

4.06.7

The Contractor shall hold harmless, defend and indemnify the Design Professional and the separate Contractors of the University from and against losses to the extent they arise from the negligent acts or omissions or willful misconduct of the Contractor, a subcontractor, anyone directly or indirectly employed by the Contractor or subcontractor, or anyone for whose acts the Contractor or subcontractor may be liable.

4.07 Occupancy by University Prior to Acceptance

The University may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by public authorities having jurisdiction over the Work. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the University and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a description of the area substantially complete to the Design Professional. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the University and Contractor or, if no agreement is reached, by decision of the Design Professional.

Immediately prior to such partial occupancy or use, the University together with the Contractor and Design Professional shall jointly observe and/or 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.

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. Likewise,

partial occupancy or use of a portion or portions of the Work shall not alter, change or modify the requirements for Substantial or Final Completion within Contract Time.

4.08 Contract Time

4.08.1 Time of the Essence

All time limits specified in this Contract are of the essence of the Contract.

4.08.2 Starting and Completion Date

The University shall designate in the Notice to Proceed the starting date of the Contract on which the Contractor shall immediately begin and thereafter diligently prosecute the Work to completion. The Contractor agrees to complete the Work on the date specified for completion of the Contractor's performance in the Contract unless such time is adjusted, in writing, by change order issued by the University. The Contractor may complete the Work before the completion date if it will not interfere with the University or their other Contractors engaged in related or adjacent Work. The date of Substantial Completion shall be used as the commencement date of the guarantee.

4.08.3 Delay

Within ten (10) days from the commencement of a delay, Contractor shall submit to the University's Representative a written notice of the delay. Such notice of delay shall describe the nature and cause of the delay, provide a preliminary estimate of the impact of said delay on the construction schedule and provide a recovery plan to mitigate the delay. The Contractor's failure to give such notice to the University shall constitute a waiver by the Contractor of its ability to request an extension of time. In the case of a continuing cause of delay, only one claim shall be necessary. The giving of such notice shall not of itself establish the validity of the cause of delay or of the extension of the time for completion. Submission of reports and/or updates required at regularly scheduled meetings or as a part of a regularly submitted report shall not constitute such required notice.

The Contractor expressly agrees that delays to construction activities which do not affect the overall time of completion of the Work shall not entitle the Contractor to an extension of the Contract Time or provide a basis for additional cost or damages. No delay, obstruction, interference, hindrance, or disruption, from whatever source or cause in the progress of the Contractor's Work shall be a basis for an extension of time unless the delay, obstruction, interference, hindrance, or disruption is without the fault and not the responsibility of the Contractor and directly affects the overall completion of the Work as reflected in the Contractor's updated and accepted Project schedule.

Within fifteen (15) days from the submittal to the University of the notice of delay detailed in the previous paragraphs, Contractor shall submit to the University's Representative a request for an extension of time which shall include all documentation supporting the request. Such submittal shall include a detailed description of all changes in activity duration, logic, sequence, or otherwise in the Project schedule. The filing of such a request for an extension of time shall not of itself establish the validity of the cause of delay or of the extension of time for completion. Submission of construction reports and/or updates required by these General and Supplementary Conditions shall not constitute such a request.

4.08.4 Adjustment of Contract Time and Cost

If the Contractor is delayed, obstructed or hindered at any time in the progress of the Work by any act or neglect of the University or by any contractor employed by the University, or by changes



ordered in the scope of the Work, or by fire, adverse weather conditions not reasonably anticipated, or any other causes beyond the control of the Contractor with the exception of labor disputes or strikes of the Contractor's or a Subcontractor's own personnel, then the duration set forth in the Master Project Schedule, and established for Substantial and Final Completion may be extended as agreed to by the University, Contractor and Design Professional. When such delays result in an agreement to adjust the Time of Completion, then the Contractor may also request, and the University may make a reasonable adjustment to the Contract Sum for Project costs directly attributable to the delay pursuant to Article 6.00, CHANGES IN THE WORK. It will be the Contractor's obligation to demonstrate to the complete satisfaction of the University, that the direct Project costs associated with such delays are justified, fair, and reasonable.

The University will not recognize labor disputes, strikes, work stoppages, picketing or boycotting by employees of or under the control or direction of the Contractor or its subcontractors, to be cause for extending the Construction Project Schedule or the Contract Time or adjusting the Contract Sum. The University may recognize labor disputes, strikes, work stoppages, picketing or boycotting that are not within the Contractor's or its subcontractors' control as cause for extending the Construction Project Schedule or Contract Time. Pursuant to section 9.01.1 such labor disputes, strikes, work stoppages, picketing or boycotts may constitute grounds for termination of the Contractor.

4.08.5 Contractor to Fully Prosecute Work

No extension of time will be granted unless the Contractor demonstrates to the satisfaction of the University that the Contractor has made every reasonable effort to complete all Work under the Contract not later than the date prescribed.

4.08.6 University's Adjustment of Contract Time

Even though the Contractor has no right to an extension of time for completion, the University may in the exercise of its sole discretion extend the time at the request of the Contractor if it determines it to be in the best interest of the University. .

4.08.7 Adjustment of Contract Time and Cost Due to Reasons Beyond University Control

Should the University be prevented or enjoined from proceeding with Work either before or after the start of construction by reason of any litigation or other reason beyond its control, the Contractor may request an adjustment in the Time of Completion and/or Contract Sum by reason of said delay. The University may make a reasonable adjustment in the Time of Completion and/or Contract Sum for time and costs directly attributable to the delay. It will be the Contractors obligation to demonstrate to the complete satisfaction of the University, that all Time of Completion and Contract Sum adjustments associated with such delays are justified, fair, and reasonable.

4.09 Progress Schedule

4.09.1

The Contractor shall prepare and submit to the University the Contractor's Construction Schedule utilizing the Critical Path Method within ten (10) days after starting date on the Notice to Proceed. It shall be the Contractor's responsibility to use its best efforts and to act with due diligence to maintain the progress of the Work in accordance with the schedule. The time for completion may be extended only by a written Change Order executed by the University and the Contractor. The work activities making up the schedule shall be of



sufficient detail to assure that adequate planning has been done for proper execution of the Work and such that, in the sole judgment of the University, it provides an appropriate basis for monitoring and evaluating the progress of the Work. The Construction Schedule shall include the time periods required for utility and service interruptions, including compliance with the notice periods stated in the Utility Disturbance and Disruption Request. The Contractor shall also submit a separate progress schedule listing all submittals required under the Contract and the date by which each submittal will be submitted allowing 10 days for the Design Professional's review ("submittal schedule").

4.09.4

Float, slack time, or contingency within the schedule at the activity level and total float within the overall schedule, is not for the exclusive use of either the University or the Contractor, but is jointly owned by both and is a resource available to and shared by both parties as needed to meet Contract milestones and the Contract completion date.

4.09.5

The Contractor shall not sequester shared float through such strategies as extending activity duration estimates to consume available float, using preferential logic, or using extensive crew/resource sequencing, etc. Since float time within the construction schedule is jointly owned, it is acknowledged that University caused delays on the Project may be offset by University caused time savings (i.e., critical path submittals returned in less time than allowed by the Contract, approval of substitution requests which result in a savings of time to the Contractor, etc.). In such an event, the Contractor shall not be entitled to receive a time extension until all University caused time savings are exceeded and the Contract completion date is also exceeded.

4.09.6

Regardless of which schedule method the Contractor elects to use in formulating the Contractor's Construction Schedule, an updated construction schedule shall be submitted to the University five (5) days prior to the submittal of the Contractor's monthly payment request. The submission of the updated construction schedule satisfying the requirements of this Article, accurately reflects the status of the Work, and incorporates all changes into the schedule, including actual dates, shall be a condition precedent to the processing of monthly payment applications. Updated schedules shall also be submitted at such other times as the University may direct. Upon approval of a change order or issuance of a direction to proceed with a change, the approved change shall be reflected in the next schedule update submitted by the Contractor.

4.09.7

If completion of any part of the Work, the delivery of equipment or materials, or issuance of the Contractor submittals is behind the updated Construction Schedule and will cause the end date of the Work to be later than the Contract completion date, the Contractor shall submit in writing a plan acceptable to the University for completing the Work on or before the current Contract completion date.

4.09.8

No time extensions shall be granted unless the delay can be clearly demonstrated by the Contractor on the basis of the updated Construction Schedule current as of the month the change is issued or the delay occurred, and the delay cannot be mitigated, offset, or eliminated through such actions as revising the intended sequence of Work or other means.

4.09.9

As a condition precedent to the release of retained funds, the Contractor shall, after completion of the Work has been achieved, submit a final Construction Schedule which accurately reflects the manner in which the Project was constructed and includes actual start and completion dates for all Work activities on the Project schedule together with a full and unconditional waiver and release of claims for payment in a form acceptable to the University.

4.10 Coordination With Other Work

The University reserves the right to do other Work in connection with the Project or adjacent thereto and the Contractor shall at all times conduct the Work so as to impose no hardship on the University or others engaged in the University's Work nor to cause any unreasonable delay or hindrance thereto.

Where two or more Contractors are employed on related or adjacent work, each shall conduct their operation in such a manner as not to cause delay or additional expense to the other.

The Contractor shall be responsible to others engaged in the related or adjacent work for all damage to Work, to persons and to property, and for loss caused by failure to complete the Work within the specified time for completion. The Contractor shall coordinate its Work with the Work of others so that no discrepancies shall result in the Project.

4.11 As-built Drawings Reflecting Actual Construction

During the course of construction, the Contractor shall maintain drawings kept up each day to show the Project as it is actually constructed. Every sheet of the plans and specifications which differs from the actual construction shall be marked and sheets so changed shall be noted on the title sheets of the plans and specifications. All change orders shall be shown by reference to sketch drawings, and any supplementary drawings or change order drawings shall be included. The Contractor shall review the "As-built" drawings with the University at least once a month to demonstrate that all changes that have occurred are being fully and accurately recorded. The altered Contract drawings shall be sufficiently detailed so that future Work on the Project or in adjacent areas may be conducted with a minimum of difficulty. Prior to the completion of the Project, and prior to release of the final retention payments, the "As-built" drawings and specifications shall be transmitted in hard copy and electronic format as directed by the University to the University or the Design Professional for further review. A copy of the transmittal shall be sent to the University and included in the formal Close-out documents.

4.12 Cleanup of Project and Site

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

If the Contractor fails to clean up as provided in the Contract Documents, the University may do so and the cost thereof shall be charged to the Contractor. Any additional cleaning requirements are as stated in the Supplementary General Conditions.

Upon completion of the Work, the Contractor shall promptly remove from the premises construction equipment and any waste materials not previously disposed of, leaving the premises thoroughly clean and ready for occupancy.



When two or more Contractors are engaged in work at or near the site, each shall be responsible for cleanup and removal of its own rubbish, equipment, and any waste materials not previously disposed.

In the event the Contractor does not maintain the Project or the site clear of debris and rubbish in a manner acceptable to the Design Professional or University, the University may, at its option, cause the Project or site to be properly cleaned and may withhold the incurred expense from payments due the Contractor or otherwise receive reimbursement from the Contractor.

4.13 [Not used]

4.14 Project Sign, Advertising

If included as a requirement in the project documents, Contractor shall furnish and install a project sign as designed by the Design Professional and accepted by the University as part of the Work under the Contract. As a minimum, the sign shall be four feet by eight feet, made from three-quarter inch plywood. The sign shall identify the Project name, the University including the individual members of the Board of Governors, the Design Professional, and the Contractor. No advertising is permitted on the Project or site without written permission from the University. If the Project is funded by a State of Michigan capital appropriation, the Contractor shall also provide a project sign which satisfies the requirements of the State of Michigan as stipulated in the Department of Technology Management and Budget's Major Project Design Manual, current edition.

5.00 INTERPRETATION OF AND ADHERENCE TO CONTRACT REQUIREMENTS

5.01 Interpretation of Contract Requirements

5.01.1 Conflicts

In the event of conflict in the Contract Documents, the priorities stated below shall govern:

- (1) Addenda shall govern over all other Contract Documents and subsequent addenda shall govern over prior addenda only to the extent that they modify prior addenda. Such addenda shall only govern the scope of Work, Contract Sum, and Time of Completion, and shall not be deemed to amend the Contract, General Conditions of Construction, or Supplementary General Conditions of Construction.
- (2) In case of conflict between plans and specifications, the specifications take precedence over drawings for the specific type or quality of materials or the quality of installation; the drawings take precedence over the specifications with regard to quantities, locations or detail of installation.
- (3) Conflicts within the plans:
 - (a) Schedules, when identified as such, shall govern over all other portions of the plans.
 - (b) Specific notes shall govern over all other notes and all other portions of the plans except the schedules described in Article 5.01.1, above.
 - (c) Larger scale drawings shall govern over smaller scale drawings.
 - (d) Figured or numerical dimensions shall govern over dimensions obtained by scaling. Scaling the drawings is prohibited.
- (4) Conflicts within the specifications:



"General Conditions for Construction" shall govern over all sections of the specifications except for specific modifications thereto that may be stated in Supplementary General Conditions or addenda. No other section of the specifications shall modify the General Conditions for Construction.

- (5) In the event provisions of codes, safety orders, Contract Documents, referenced manufacturer's specifications or industry standards are in conflict, the more restrictive or higher quality shall govern.

5.01.2 Omissions

If the Contract Documents are not complete as to any minor detail of a required construction system or with regard to the manner of combining or installing of parts, materials, or equipment, but there exists an accepted trade standard for good and skillful construction, such detail shall be deemed to be an implied requirement of the Contract Documents in accordance with such standard. "Minor Detail" shall include the concept of substantially identical components, where the price of each such component is small even though the aggregate cost or importance is substantial, and shall include a single component which is incidental, even though its cost or importance may be substantial.

The quality and quantity of the parts or material so supplied shall conform to trade standards and be compatible with the type, composition, strength, size, and profile of the parts of materials otherwise set forth in the Contract Documents.

5.01.3 Miscellaneous

Portions of the Work which can be best illustrated by the Drawings may not be included in the Specifications and portions best described by the Specifications may not be depicted on the Drawings.

If an item or system is either shown or specified, all material and equipment normally furnished with such items and needed to make a complete operating installation shall be provided whether mentioned or not, even though such materials and equipment are not shown on the drawings or described in the specifications, omitting only such parts as are specifically excepted. Words and abbreviations which have well-known technical or trade meanings are used in the Contract Documents in accordance with such recognized meanings.

The General Conditions and Supplementary General Conditions are a part of each and every section of the Specifications.

All drawings, Project Plans and Specifications, renderings and models or other documentation, and copies thereof, furnished by the University or any agent, employee or consultant of the University, or Design Professional, are and shall remain the property of the University. They are to be used only with respect to this Project and are not to be used on any other project.

5.01.4 Interpreter of Documents

The University's Representative shall be the Interpreter, with the advice of the Design Professional, of the Contract Documents and shall be the judge of the performance of the Contractor and subcontractors. Subject to the provisions Article 7, claims, disputes and other matters of controversy relating to the Contract Documents or the Work shall be decided by the University's Representative. The decision of the University's Representative shall be final.

5.02 Issuance of Interpretations, Clarifications, Additional Instructions

(Requests for Information)

Should the Contractor discover any conflicts, omissions, or errors in the Contract or have any question concerning interpretation or clarification of the Contract Documents, the Contractor shall request in writing an interpretation, clarification, or additional detailed instructions before proceeding with the Work affected. The written request shall be given to the Design Professional and University within 5 days of discovery.

The Design Professional, with review as required by the University, shall, within 10 days or other reasonable time, issue in writing the interpretation, clarification, or additional detailed instructions requested. In the event that the Contractor believes that the progress of the Work is being delayed by a Request for Information or a response to a Request for Information, Contractor shall comply with the procedures stated in section 4.08 of these General Conditions for an extension of time.

Should the Contractor proceed with the Work affected before receipt of the interpretation, clarification, or instructions from the Design Professional, the Contractor shall replace or adjust any Work not in conformance therewith and shall be responsible for any resultant damage or added cost.

Should any interpretation, clarification, or additional detailed instructions, in the opinion of the Contractor, constitute Work beyond the scope of the Contract, the Contractor must submit written notice thereof to the Design Professional and University within five (5) calendar days following receipt of such interpretation, clarification, or additional detailed instructions and in any event prior to commencement of Work thereon. The Contractor shall submit an explanation of how the interpretation, clarification, or additional detailed instruction constitutes work beyond the scope of the Contract, along with a detailed cost breakdown and an explanation of any delay impacts. The Design Professional shall consider such notice and make a recommendation to the University. If, in the judgment of the University, the notice is justified, the interpretation, clarification or additional detailed instructions shall either be revised or the extra work authorized by Contract change order or by field instruction with a change order to follow. If the University decides that the request is not justified and the Contractor does not agree, the Contractor shall nevertheless perform such Work upon receipt from the University of written authorization to do so. In such case, the Contractor shall have the right to have the Claim later determined only pursuant to the requirements of this Contract. However, any such Claim for additional compensation because of such interpretation, clarification, or additional detailed instruction is waived, unless the Contractor gives written notice to the Design Professional and University within five (5) calendar days as specified above.

5.03 Product and Reference Standards**5.03.1 Product Designation**

When descriptive catalog designations, including the manufacturer's name, product brand name, or model number are referred to in the Contract Documents, such designations shall be considered as being those found in industry publications of current issue at the date of Contract execution.

5.03.2 Reference Standards

When standards of the federal government, trade societies, or trade associations are referred to in the Contract Documents by specific date of issue, these shall be considered a part of this Contract. When such references do not bear a date of issue, the current and most recently published edition at the date of Contract execution shall be considered a part of this Contract.

5.04 Shop Drawings, Samples, Alternatives or Equals, Substitutions**5.04.1 Submittal Procedure**



Shop drawings include drawings, diagrams, illustrations, schedules, performance charts, brochures and catalogs and other data prepared by the Contractor or any subcontractor, manufacturer, supplier or distributor, and which illustrate some portion of the Work. In accordance with the submittal schedule, the Contractor shall promptly review and approve all shop drawings and then submit the shop drawings to the Design Professional together with samples as required by the Contract Documents and shall also submit any offers of alternatives or substitutions. The Design Professional shall have 10 days to respond with an acknowledgement of approval, clearly defined exceptions, or rejections. Rejections shall be cause for re-submission and no contract time adjustments will be granted for such requirements. At least six copies of brochures, one copy of shop drawings and one PDF digital file of shop drawings shall be submitted as well as additional copies as required by Design Professional. All such submittals shall be sent to Design Professional at the address given in the instructions to the Contractor at the job start meeting. A letter shall accompany the submitted items which shall contain a list of all matters submitted and shall identify all deviations shown in the shop drawings and samples from the requirements of the Contract Documents. Failure by the Contractor to identify all deviations may render void any action taken by the Design Professional on the materials submitted. Whether to void such action shall be in the discretion of the Design Professional. The letter and all items accompanying it shall be fully identified as to project name and location, the Contractor's name, and the University's Project number. By submitting the approved shop drawings and samples, the Contractor warrants and represents that the data contained therein have been verified with conditions as they actually exist and that the shop drawings and samples have been checked and coordinated with the Contract Documents.

5.04.2 Samples

Samples are physical examples furnished by the Contractor to illustrate materials, equipment, color, texture, or worker ship, and to establish standards by which the Work will be judged. Unless otherwise approved, at least two samples will be submitted for each item requiring samples to be submitted.

The Work shall be in accordance with the samples and reviewed by Design Professional. Samples shall be removed by the Contractor from the site when directed. Samples not removed by the Contractor, will become the property of the University and will be removed or disposed of by the University at the Contractor's expense.

5.04.2.1 Mock-ups as may be required by the Contract Documents

Mock-ups, models or temporary construction as may be required by the University shall be removed and disposed of by the Contractor at Contractor's sole cost and expense from the site when directed.

5.04.3

5.04.3 Substitutions

For convenience in designation on the plans or in the specifications, certain materials or equipment may be designated by a brand or trade name or the name of the manufacturer together with catalog designation or other identifying information, hereinafter referred to generically as "designated by brand name." Alternative material or equipment which is of equal quality and of the required characteristics for the purpose intended may be proposed for use provided the Contractor complies with the requirements stated in this section. If the Contractor proposes a product that is of lesser or greater quality or performance than the specified material or equipment, Contractor must both comply with the provisions of section 5.04 and submit any cost impact. The Contractor shall submit its proposal to University and the Design Professional for an alternative in writing within the time limit designated in the Contract, or if not so designated, then within a period which will cause



no delay in the Work. By submitting a substitute, the Contractor waives any rights to claim a delay due to the processing of this substitution.

The Contractor may offer a substitution of a specified or indicated item if it presents complete information concerning the substitution and the benefits thereof to the University by reason of lower cost or improved performance, or both, over the specified or indicated item. However, such submission of a proposed substitution does not relieve the Contractor from its obligations under the Contract. In proposing a substitution, the Contractor warrants that the substitution is, at a minimum, equivalent in performance to the specified or indicated item. A substitution shall not be effective unless accepted in writing by the University.

Any additional costs and changes to the Work (including, but not limited to the Work of other Contractors and additional design costs which may be affected thereby) which may result from the proposed substitution shall be disclosed at the time the substitution is proposed to the University. Changes to the Work and any additional costs therefrom shall be the sole responsibility of the Contractor and shall not increase the Contract Sum.

The Contractor's substitution proposals shall include written descriptions of the items to be substituted (including drawings and/or specifications) and referenced information of the proposed substitution. The Design Professional and University's Representative's signature on this proposal is required for acceptance. Shop Drawings will not be considered a substitution proposal pursuant to this section. Verbal approvals or approved Shop Drawings will not be considered as acceptance of proposed substitutions.

5.05 Quality of Materials, Articles and Equipment

Materials, articles and equipment furnished by the Contractor for incorporation into the Work shall be new unless otherwise specified in the Contract Documents. When the Contract requires that materials, articles or equipment be furnished, but the quality or kind thereof is not specified, the Contractor shall furnish materials, articles or equipment at least equal to the kind or quality or both of materials, articles or equipment which are specified.

5.06 Testing Materials, Articles, Equipment and Work

Materials, articles, equipment or other Work requiring tests are specified in the Contract Documents. Materials, articles and equipment requiring tests shall be delivered to the site in ample time before intended use to allow for testing and shall not be used prior to testing and receipt of written approval. The Contractor shall be solely responsible for notifying the University where and when materials, articles, equipment and Work are ready for testing. Should any such materials, articles, equipment or Work be covered without testing and approval, if required, they shall be uncovered at the Contractor's expense. The University has the right to order the testing of any other materials, articles, equipment or Work at any time during the progress of the Work. Unless otherwise directed, all samples for testing shall be taken by the University from materials, articles or equipment to be used on the project or from Work performed. All tests will be under the supervision of, and at locations convenient to, the University. The University shall select the laboratories for all tests. Decisions regarding the adequacy of materials, articles, equipment or Work shall be issued to the University in writing. The University may decide to take further samples and tests, and if the results show that the Work was not defective, the University shall bear the costs of such samples and tests. In the event the results of such additional samples and tests show that the Work was defective, the Contractor shall bear the cost of such samples and tests. Samples that are of value after testing shall remain the property of the Contractor. All retesting and reinspection costs may be back charged to the Contractor by the University.

5.07 Rejection



Should any portion of the Work or any materials, articles or equipment delivered to the Project fail to comply with the requirements of the Contract Documents, such Work, materials, articles or equipment shall be rejected in writing and the Contractor shall immediately correct the deficiency to the satisfaction of the Design Professional and the University at no additional expense to the University. Any Work, materials, articles or equipment which is rejected shall immediately be removed from the premises at the expense of the Contractor. The University may retain one and one-fourth times the cost of the rejected materials, articles, equipment, and Work from any payments due the Contractor until such time as the deficiency is made acceptable to the Design Professional and University.

5.08 Responsibility for Quality

The testing and inspection provided by the University shall not relieve the Contractor of its responsibility for the quality of materials and workmanship provided by the Contractor, and the Contractor shall make good all defective Work discovered during or after completion of the Project.

6.00 CHANGES IN THE WORK

6.01 Change Orders

6.01.1 Generally

The University reserves the right to issue written orders whether through a formal Change Order or Preliminary Project Cost and Schedule Impact Report, directing changes in the Contract at any time prior to the acceptance of the Project without voiding the Contract, and Contractor shall promptly comply with such order or direction. The Contractor may request changes in the Work, but shall not act on the changes until approved in writing by the University. Any change made without authority in writing from the University shall be the responsibility of the Contractor.

Any such changes in the Work that have a cost impact shall only be authorized by Change Orders approved by the University. No action, conduct, omission, prior failure or course of dealing by the University shall act to waive, modify, change or alter the requirement that Change Orders must be in writing and signed by the University and Contractor and that such written Change Orders are the exclusive method for changing or altering the Contract Sum or Contract Time. The University and Contractor understand and agree that the Contract Sum and Contract Time cannot be changed by implication, oral agreements, actions, inactions, course of conduct or Preliminary Project Cost and Schedule Impact Report.

On the basis set forth herein, the Contract Sum may be adjusted for any Change Order requiring a different quantity or quality of labor, materials or equipment from that originally required, and the partial payments to the Contractor, set forth in section 8.01, may be adjusted to reflect the change. Whenever the necessity for a change arises, and when so ordered by the University in writing, the Contractor shall take all necessary steps to mitigate the effect of the ultimate change on the other Work in the area of the change. Changed Work shall be performed in accordance with the original Contract requirements except as modified by the Change Order. Except as herein provided, the Contractor shall have no claim for any other compensation including lost productivity or increased overhead expenses due to changes in the Work.

6.01.2 Proposed Change Orders

The Design Professional, with approval of the University, shall issue to the Contractor a cost request Bulletin for a proposed change order describing the intended change and shall require the Contractor to indicate thereon a proposed amount to be added to or subtracted from the Contract Sum due to the change supported by a detailed estimate of cost. Upon request by the University, the Contractor shall permit inspection of the



original Contract estimate, Trade Contract agreements, or purchase orders relating to the change. Any request for adjustment in Contract Time which is directly attributable to the changed Work shall be included with substantiating detailed explanation by the Contractor in its response to the cost request bulletin. Failure by Contractor to request adjustment of Contract Time on the response to the cost request Bulletin shall waive any right to subsequently claim an adjustment of the Contract Time based on the changed Work. The Contractor shall submit the response to the cost request Bulletin with detailed estimates and any time extension request thereon to the Design Professional within ten (10) days after issuance of the cost request Bulletin. Upon its submission, the Design Professional will review it and advise the University who will make the decision regarding the request. The University retains sole discretion to accept, reject, or modify the proposed change. If the Contractor fails to submit the response within the required ten (10) days, and the Contractor has not obtained the Design Professional's and the University's permission for a delay in submission, the University may order the Contractor in writing to begin the Work immediately, and the Contract Sum shall be adjusted in accordance with the University's estimate of cost. In that event, the Contractor, within fifteen days following completion of the changed Work, may present information to the University that the University's estimate was in error; the University, in its sole discretion, may adjust the Contract Sum. The Contractor must keep and submit to the University time and materials records verified by the University to substantiate its costs. The University may require the Contractor to proceed immediately with the changed Work in accordance with section 6.01.4, "Failure to Agree as to Cost" or section 6.02 "Emergency Changes."

When the University and the Contractor agree on the amount to be added to or deducted from the Contract Sum and the time to be added to or deducted from the Contract Time and a Contract Change Order is signed by the University and the Contractor, the Contractor shall proceed with the changed Work. If agreement is reached as to the adjustment in compensation for the performance of changed Work but agreement is not reached as to the time adjustment for such Work, the Contractor shall proceed with the Work at the agreed price, reserving the right to further pursue its Claim for a time adjustment. Any costs incurred to acquire information relative to a proposed Change Order shall not be borne by the University.

6.01.3 Allowable Costs Upon Change Orders

The identification of and manner in which costs will be allowed because of changed Work shall be computed as described by this section.

6.01.3.1 Labor

Costs are allowed for the actual payroll cost to the Contractor for direct labor, engineering or technical services directly required for the performance of the changed Work, (but not site management such as field office estimating, clerical, project engineering, management or supervision) including payments, assessments, or benefits required by lawful labor union collective bargaining agreements, compensation insurance payments, contributions made to the State pursuant to the Unemployment Insurance Code, and for taxes paid to the federal government required by the Social Security Act of 1935, as amended, unless the time of completion adjustments affect the general condition inclusion of the Contract Sum.

No labor cost will be recognized at a rate that deviates from the prevailing wages in the locality at the time the Work is performed as provided by the University for Wayne County, Michigan, or of wage and benefit rates associated with trade union collective bargaining agreements prevailing at the time of the change, and the use of a classification which would increase the labor cost may not be permitted unless the Contractor established to the satisfaction of the University the necessity for payment at a higher rate.

6.01.3.2 Materials



Costs are allowed for the actual cost to the Contractor for the materials directly required for the performance of the changed Work. Such cost of materials may include the costs of transportation, sales tax, and delivery if necessarily incurred. However, overhead costs shall not be included. If a trade discount by the actual supplier is available to the Contractor, it shall be credited to the University. If the materials are obtained from a supply or source owned wholly or in part by the Contractor, payment therefor will not exceed the current wholesale price for such materials.

If, in the opinion of the University, the cost of materials is excessive, or if the Contractor fails to furnish satisfactory evidence of the cost from the actual suppliers thereof, then in either case the cost of the materials shall be deemed to be the lowest wholesale price at which similar materials are available in the quantities required at the time they were needed.

6.01.3.3 Equipment

Costs are allowed for the actual cost to the Contractor for the use of equipment directly required in the performance of the changed Work except that no payment will be made for time while equipment is inoperative due to breakdowns or for non-working days. The total rental cost shall not exceed seventy-five percent (75%) of the market value of the rented equipment. The rental time shall include the time required to move the equipment to the Project site from the nearest available source for rental of such equipment, and to return it to the source. If such equipment is not moved by its own power, then loading and transportation costs will be paid. However, neither moving time nor loading and transportation costs will be paid if the equipment is used on the Project in any other way than upon the changed Work. Individual pieces of equipment having a replacement value of \$500.00 or less shall be considered to be tools or small equipment, and no payment therefor will be made.

For equipment owned or furnished by the Contractor, no cost therefor shall be recognized in excess of the rental rates established by distributors or equipment rental agencies in the locality where the Work is performed. Blue Book rates shall not be used for any purpose.

The amount to be paid to the Contractor for the use of equipment as set forth above shall constitute full compensation to the Contractor for the cost of fuel, power, oil, lubrication, supplies, small tools, small equipment, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, labor (except for equipment operators who shall be paid for as provided in Article 6.01.3.1) and any and all costs to the Contractor incidental to the use of such equipment.

6.01.3.4 Change Order Mark-up Allowance

For Change Order scope whose cost is derived according to the Cost of Work plus a Fee as defined in 6.01.3.1 through 6.01.3.3, the mark-up allowance shall be as defined in the Contract. Lump-sum conditions shall include the mark-up allowance. When agreement as to cost cannot be reached, the Contractor shall execute the Work according to time and materials with the Contractor and University acknowledging such costs by signature on a daily basis, and as set forth below.

6.01.3.5 Credit for Deleted Work

For proposed change orders which involve both added and deleted Work, the Contractor shall separately estimate the cost of the added Work before mark-ups, and separately estimate the cost of the deleted Work before allowance of a credit. If the difference between the costs results in an increase to the Contract Sum, the mark-up for added Work shall be applied to the difference, and if the difference in the costs results in a decrease, then the mark-up for deleted Work shall be applied to the difference.

6.01.3.6 Market Values

Cost for added Work shall be no more than market values prevailing at the time of the change, unless the Contractor can establish to the satisfaction of the University that it investigated all possible means of obtaining Work at prevailing market values and that the excess cost could not be avoided.

When a change order deletes Work from the Contract, the computation of the cost thereof shall be the values which prevailed at the time bids for the Work were opened or the Contract Sum established.

6.01.4 Failure to Agree as to Cost

6.01.4.1 For Added Work

Notwithstanding the failure of the University and the Contractor to agree as to the cost of the proposed Change Order, the Contractor, upon written order from the University, shall proceed immediately with the changed Work. A Preliminary Project Cost and Schedule Impact Report or letter signed by the University shall be used for this written order. At the start of each day's Work on the change, the Contractor shall notify the University in writing as to the size of the labor force to be used for the changed Work and its location. Failure to so notify may result in the non-acceptance of the costs for that day. At the completion of each day's Work, the Contractor shall furnish to the University a detailed summary of all labor, materials, and equipment employed in the changed Work. The University will compare his/her records with Contractor's daily summary and may make any necessary adjustments to the summary. After the University and the Contractor agree upon and sign the daily summary, the summary shall become the basis for determining costs for the additional Work. The sum of these costs when added to an appropriate mark-up will constitute the payment for the changed Work. Subsequent adjustments, however, may be made based on later audits by the University. When changed Work is performed at locations away from the job site, the Contractor shall furnish in lieu of the daily summary, a summary submitted at the completion of the Work containing a detailed statement of labor, material, and equipment used in the Work. This latter summary shall be signed by the Contractor who shall certify thereon that the information is true.

The Contractor shall maintain and furnish on demand of the University itemized statements of cost from all vendors and subcontractors who perform changed Work or furnish materials and equipment for such Work. All statements must be signed by the vendors and the subcontractors.

6.01.4.2 For Deleted Work

When a proposed Change Order contains a deletion of any Work, and the University and the Contractor are unable to agree upon the cost thereof, the University's estimate shall be deducted from the Contract Sum and may be withheld from any payment due the Contractor until the Contractor presents adequate substantial information to the University that the University's estimate was in error. The amount to be deducted shall be the actual costs to the Contractor for labor, materials, and equipment which would have been used on the deleted Work together with an amount for mark-up as defined in the Contract Documents.

6.01.5 Allowable Time Extensions

For any change in the Work, the Contractor shall only be entitled to such adjustments in Contract Time due solely to performance of the changed Work. The procedure for obtaining an extension of time is set forth in Section 4.08 of these General Conditions. No extension of time shall be granted for a change in the Work unless the Contractor demonstrates to the satisfaction of the University that the Work is on the critical path and submits an updated Critical Path Method schedule showing that an extension of time is required and that the Contractor is making, or has made, every reasonable effort to guarantee completion of the additional Work called for by the change within the time originally allotted for the Contract. Failure by the Contractor to make the required submission or showing constitutes a waiver of any possible adjustment in Contract Time.

Any adjustment in Contract time shall specify the exact impact on the date of Substantial Completion and Final Completion.

6.02 Emergency Changes

Changes in the Work made necessary due to unforeseen site conditions, discovery of errors in plans or specifications requiring immediate clarification in order to avoid a serious Work stoppage, changes of a kind where the extent cannot be determined until completed, or under any circumstances whatsoever when deemed necessary by the University are kinds of emergency changes which may be authorized by the University in writing to the Contractor. The Contractor shall commence performance of the emergency change immediately upon receipt of Preliminary Project Cost and Schedule Impact Report issued by the University.

If agreement is reached as to compensation adjustment for the purpose of any emergency change, then compensation will be as provided in this section relating to ordinary changes. If agreement is not reached as to compensation at the time of commencing the emergency change, then compensation will be as provided in section 6.01.4, that is, time and materials records and summaries shall be witnessed and maintained until either a lump sum payment is agreed upon, or the changed Work is completed.

6.03 Preliminary Project Cost and Schedule Impact Report

The Contractor shall perform Work as directed by the University through a Preliminary Project Cost and Schedule Impact Report. The cost of the changed Work is to be determined as stated in the Preliminary Project Cost and Schedule Impact Report or pursuant to section 6.01.4.

7.00 CLAIMS AND DISPUTES

7.01 Policy of Cooperation

The parties shall endeavor to resolve all of their claims and disputes amicably and informally through open communication and discussion of all issues relating to the Project. To the greatest extent possible, the parties shall avoid invoking the formal dispute resolution procedures contained in the Contract Documents.

7.02 Recommendation of Design Professional

Claims, including those alleging an error or omission by the Design Professional, must be referred initially to the Design Professional for action as provided in paragraph 7.09 as an express condition precedent to proceeding further in resolving any claim.

7.03 Time Limits on Claims

Claims must be made within 5 days after occurrence of the event giving rise to such Claim or within 5 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Claims must be made by written notice. An additional Claim made after the initial Claim has been resolved by Change Order will not be valid.

7.04 Continuing Contract Performance

Pending final resolution of a Claim, unless otherwise agreed in writing, the Contractor shall proceed diligently with performance of the Contract and the University shall continue to make payments in



accordance with the Contract Documents subject to the University's rights relative to payments, withholding of payments, termination, or all other rights afforded it in the Contract Documents.

7.05 Claims for Concealed or Unknown Conditions

If conditions are encountered at the site which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, 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, then written notice by the observing party shall be given to the other party promptly before conditions are disturbed and in no event later than 48 hours after first observance of the conditions. The Design Professional will promptly investigate such conditions and, if the conditions 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, the Design Professional will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Design Professional 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 Design Professional shall so notify the University and Contractor in writing, stating the reasons. Claims by either party in opposition to such determination must be made within 10 days after the Design Professional has issued such determination. If the University and Contractor cannot agree on an adjustment in the Contract Sum or Contract Time, the adjustment shall be referred to the Design Professional for initial determination, subject to further proceedings pursuant to Paragraph 7.09.

7.06 Claims for Additional Cost

Any Claim by the Contractor for an increase in the Contract Sum shall be submitted in writing as required by the Contract Documents before proceeding to execute the Work. If the Contractor believes additional cost is involved for reasons including but not limited to (1) a written interpretation from the Design Professional, (2) an order by the University to stop the Work where the Contractor was not at fault, (3) a written order for a minor change in the Work issued by the Design Professional, (4) failure of payment by the University, (5) termination of the Contract by the University, (6) University's suspension or (7) changes in the scope of Work, the Contractor's claim shall be filed in strict accordance with the procedure established herein.

7.07 Claims for Additional Time

Any Claim by Contractor for an increase in the Contract Time shall be submitted in writing as required by the Contract Documents. The Contractor's Claim shall include an estimate of the probable effect of delay on progress of the Work. In the case of a continuing delay only one Claim is necessary.

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 and could not have been reasonably anticipated, and that weather conditions had an adverse effect on the scheduled construction.

7.08 Injury or Damage to Person or Property

If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, of any of the other party's employees or agents, or of others for whose acts such party is legally liable, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 5 days after first observance. The notice shall provide sufficient detail to enable the other party to investigate the matter. If a Claim for additional cost or time related to this Claim is to be asserted, it shall be filed as provided in the Contract Documents.

7.09 Resolution of Claims and Disputes

7.09.1 Review by Design Professional

Design Professional will review all Claims and take one or more of the following preliminary actions within 10 days of receipt of a Claim: (1) request additional supporting data from the Claimant, (2) submit a schedule to the parties indicating when the Design Professional expects take action, (3) reject the Claim in whole or in part, stating reasons for rejection, (4) recommend approval of the Claim by the other party or (5) suggest a compromise. The Design Professional may also, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim.

If a Claim has been resolved, the Design Professional will prepare or obtain appropriate documentation. If a Claim has not been resolved, the party making the Claim shall, within 10 days after the Design Professional's preliminary response, take one or more of the following actions: (1) submit additional supporting data requested by the Design Professional, (2) modify the initial Claim or (3) notify the Design Professional that the initial Claim stands.

If a Claim has not been resolved after consideration of the foregoing and of further evidence presented by the parties or requested by the Design Professional, the Design Professional will notify the parties in writing that the Design Professional's opinion will be rendered within 5 days. Upon expiration of such time period, the Design Professional will render to the parties the Design Professional's determination relative to the Claim, including any change in the Contract Sum or Contract Time or both. If there is a surety and there appears to be a possibility of a Contractor's default, the Design Professional may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy. The determination by the Design Professional shall be subject to the review and approval of the Associate Vice President of Facilities Planning and Management at Wayne State University.

7.09.2 Review by Associate Vice President of Facilities Planning and Management

The determination by the Design Professional shall be subject to the review and approval of the Associate Vice President of Facilities Planning and Management at Wayne State University who may request additional information from the Claimant for review and consideration. The Associate Vice President of Facilities Planning and Management may issue a schedule for further discussions, review or decision. Upon decision by the Associate Vice President of Facilities Planning and Management, if the Claimant seeks further review, the matter shall be submitted to the Vice-President of Finance and Business Operations.

7.09.3 Review Vice-President of Finance and Business Operations

If the determination by the Design Professional and the decision of the Associate Vice President does not resolve the Claim, the Claimant may appeal to the Vice President of Finance and Business Operations who shall review such determination and the supporting information submitted by the parties for the purpose of upholding, modifying, or rejecting the determination. The Vice President of Finance and Business Operations shall render a decision within forty-five days of the completion of any submissions by the parties. The decision of the Vice President of Finance and Business Operations is final unless it is challenged by either party by filing a lawsuit in the Court of Claims of the State of Michigan within one year of the issuance of the decision.

7.09.4 Jurisdiction



Sole and exclusive jurisdiction over all claims, disputes, and other matters in question arising out of or relating to this Contract or the breach thereof, shall rest in the Court of Claims of the State of Michigan. No provision of this agreement may be construed as the University's consent to submit any claim, dispute or other matter in question for dispute resolution pursuant to any arbitration or mediation process, whether or not provisions for dispute resolution are included in a document which has been incorporated by reference into this agreement.

7.09.5 Condition Precedent

The process and procedures described in Article 7.09 are an express condition precedent to the Contractor filing or pursuing any legal remedy, including litigation. Pursuing litigation by the Contractor prior to exhaustion of the procedures set forth herein shall be premature and a material breach of this Agreement.

8.00 PAYMENT AND COMPLETION

8.01 Progress Payments

To assist in computing partial payments, the Contractor shall submit to the Design Professional and University a detailed "Schedule of Values" for review and approval by the University. The cost breakdowns shall be in sufficient detail for use in estimating the Work to be completed each month and shall be submitted within 10 days after the date of commencement of Work given in the Notice to Proceed.

Once each month during the progress of the Work, the Contractor shall submit to the Design Professional a partial payment request for review and approval. The partial payment request shall be based on the cost of the Work completed plus the acceptable materials delivered to or stored on the site under the control of the Contractor and not yet installed. The Design Professional and University shall review and certify by signature as to the validity of the request, and approving payment. Partial payments shall not be construed as acceptance of any Work which is not in accordance with the requirements of the Contract. Once the partial payment request has been certified by the Design Professional, it shall be submitted to the University for approval and processing.

The Contractor warrants that title to the Work, materials and equipment covered by an Application for Payment shall pass to the University upon the earlier of either incorporation in construction or receipt of payment by Contractor; that Work, materials and equipment covered by previous Applications for Payment are free and clear of liens, claims, security interests or encumbrances; and that no Work, materials or equipment covered by an Application for Payment will have been acquired by Contractor or by any other person performing Work at the Project or furnishing materials or equipment for the Project subject to an agreement under which an interest or encumbrance is retained by the seller or otherwise imposed on the Contractor or buyer.

All Applications for Payment shall be accompanied by sworn statements and waivers executed by Contractor, Subcontractors and suppliers whose work is included in the Application for Payment, as well as other documentation that may be required by the University, stating that all have been paid in full for Work performed through the last or most recent progress payment: The Contractor and each subcontractor shall also provide properly completed certified payroll form WH-347 to the University's with each application for payment request.

8.02 Format of Application for Payment



In addition to a schedule of values or detailed outline for the Cost of Work that is acceptable to the Contractor and University, other specific requirements for Application for Payment format and calculations include.

- Applications for Payment shall first present the itemized Cost of Work.
 - For any portion of the Work being performed according to unit pricing or time and materials pricing, invoicing and Applications for Payment must be accompanied by acceptable supporting documentation to evidence accurate quantities of actual labor, materials and equipment. Any allowed mark-ups to the actual cost of Work performed will be added to these costs separately and not included in the actual cost.
 - Change Orders executed between the Contractor and University shall be reported as separate line items within the Application for Payment and directly under applicable Subcontractor Cost of Work items. Change Orders affecting multiple Subcontractors' Cost of Work items shall be similarly numbered to permit ease of tracking. These requirements shall run through Subcontractor Applications for Payment to the Contractor to permit ease of tracking. Change Orders within a Subcontractor Application for Payment shall be appropriately labeled as being initiated by the Contractor or University to permit ease of tracking.
- The Contractor's General Conditions, Overhead and Profit shall next be calculated as the balance of the Application for Payment.

8.03 Substantial Completion, Incomplete Construction List and Punchlist

When the Contractor considers that the Work, or a portion thereof which the University agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Design Professional a comprehensive Incomplete Construction List of items to be completed or corrected, in a form agreed by the University and the Design Professional. The Contractor shall proceed promptly to complete and correct items on the Incomplete Construction List. Failure to include an item on such Incomplete Construction List does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Upon receipt of the Contractor's Incomplete Construction List, the Design Professional, with the University's Representative, will make an observation to determine whether the Work or designated portion thereof is substantially complete and will identify observable items inconsistent with the Contract Documents to be included in the Punchlist. If the Design Professional's or University Representative's observation discloses any item, whether or not included on the Contractor's Incomplete Construction List, which is not in accordance with the requirements of the Contract Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item, upon notification by the Design Professional.

The Contractor shall then submit a request for another observation by the Design Professional to determine Substantial Completion. When the Work or designated portion thereof is substantially complete, the Design Professional will prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion, shall establish responsibilities of the University and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time, generally 45 days, within which the Contractor shall finish all remaining Incomplete Construction List and Punchlist items 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. The Certificate of Substantial Completion shall be submitted to the University and Contractor for their written acceptance of responsibilities assigned to them in such Certificate.

8.03.1 Partial Completion

From time to time, as portions of the Work are completed by the Contractor, the University shall have the right, upon giving the Contractor prior written notice, to accept any portion of the Work that the University desires to



use and occupy. Such partial acceptance shall be made in writing and thereafter the Contractor shall have no further obligation with respect to the Work accepted, except to correct the Work subsequently found to have been improperly done, to replace defective materials or equipment, or as defined by Substantial Completion, Incomplete Construction List and Punchlist requirements.

8.04 Completion and Final Payment

Upon the Final Completion of the Work by the Contractor, the acceptance of the Work by the University, and the release of all claims against the University and the Work by the Contractor and its subcontractors and suppliers (which releases shall be evidenced by final waivers and releases or other documents acceptable to the University), the Contractor shall file a request for Final Payment.

8.04.1 Final Application for Payment

Upon the receipt of the Contractor's Final Application for Payment, including any and all waivers required by the University and the Contractor's provision of all Close-out Documents, and training requirements, the University shall promptly make a final inspection, and if the University finds the Work acceptable and complete in strict accordance with the Contract Documents, the University shall issue Final Payment. Final Payment shall be made upon Completion of the Work and shall indicate the University's Final Acceptance of the Work and its acknowledgment that the Work (excluding any further warranty and guaranty obligations) has been completed and is accepted under the terms and conditions of the Contract Documents. If prior to the making of Final Payment the University finds deficiencies in the Work, the University shall promptly notify the Contractor thereof in writing, describing such deficiencies in detail. After the Contractor has remedied any deficiencies noted by the University, the Contractor shall request a final inspection and the University shall make such inspection and follow the procedure set forth in this Paragraph.

8.04.2 Final Payment by the University

The making of Final Payment shall constitute a waiver of all claims by the University except those arising from: (1) unsettled liens; (2) faulty or defective work appearing after completion; (3) failure of the work to comply with the requirements of the Contract Documents; (4) terms of any special or extended warranties required by the Contract Documents; or (5) the obligations of the Contractor under the indemnification provisions of Paragraph 4.06 hereof.

The acceptance of Final Payment shall constitute a waiver of all claims by the Contractor.

8.05 Guarantee

The Contractor unconditionally guarantees the Work under this Contract to be in conformance with the Contract Documents and to be and remain free of defects in workmanship and materials not inherent in the quality required or permitted for a period required by the contract documents beginning from the date of Substantial Completion. The Subcontractors unconditionally guaranty the Work under the subcontracts to be in conformance with the Contract Documents and to be and remain free of defects in workmanship and materials for the same period from the date of Substantial Completion, unless a longer guarantee period is stipulated in the Contract Documents. By this guarantee the Contractor and Subcontractors agree, within their respective guarantee periods, to repair or replace any Work, together with any adjacent Work which may be displaced in so doing which is not in accordance with the requirements of the Contract or which is defective in its workmanship or material, all without any expense whatsoever to the University. The Contractor shall be responsible for the coordination of all such guarantee work performance or repairs.

Special guarantees that are required by the Contract Documents shall be signed by the Contractor or Subcontractor who performs the work.



Within their respective guaranty periods, the Contractor and Subcontractors further agree that within five calendar days after being notified in writing by the University of any Work not in accordance with the requirements of the Contract Documents or of any defects in the Work, it shall commence and prosecute with due diligence all Work necessary to fulfill the terms of this guarantee and to complete the Work in accordance with the requirements of the Contract with sufficient manpower and material to complete the repairs as expeditiously as possible. The Contractor, in the event of failure to so comply, does hereby authorize the University to proceed to have the Work done at the Contractor's expense, and it agrees to pay the cost thereof upon demand. The University shall be entitled to reimbursement of all costs necessarily incurred upon the Contractor's or Subcontractor's refusal to pay the above cost.

Notwithstanding the foregoing paragraph, in the event of an emergency constituting an immediate hazard to health, safety or damage of the University's employees, property, or licenses, the University may undertake at the Contractor's or Subcontractor's respective expense, without prior notice, all Work necessary to correct such hazardous conditions caused by the Work of the Contractor not being in accordance with the requirements of this Contract.

The Contractor and Subcontractor shall require a similar guarantee in all subcontracts, including the requirement that the University be reimbursed for any damage or loss to the Work or to other Work resulting from such defects.

9.00 TERMINATION

9.01 Termination by the University for Cause

9.01.1

The University may terminate the Contract if the Contractor: (a) becomes insolvent; (b) files or has filed against it any Petition in Bankruptcy or makes a general assignment for the benefit of its creditors; (c) fails to pay, when due, for materials, supplies, labor, or other items purchased or used in connection with the Work; (d) refuses or fails to prosecute the Work, or any separable part thereof, with such diligence as will ensure the completion of the Work in accordance with the Master Project Schedule; (e) in the University's opinion, fails, refuses or neglects to supply sufficient labor, material or supervision in the prosecution of the Work; (f) interferes with or disrupts, or threatens to interfere with or disrupt the operations of the University, or any other Contractor, supplier, subcontractor, or other person working on the Project, whether by reason of any labor dispute, picketing, boycotting or by any other reason; or (g) commits any other breach of the Contract Documents.

When any of the above reasons exist, the University may, without prejudice to any other rights or remedies of the University and after giving the Contractor and the Contractor's surety, if any, three days written notice and a reasonable opportunity to cure, terminate employment of the Contractor and may, subject to any prior rights of the surety: (1) take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor; (2) accept assignment of subcontracts; and (3) finish the Work by whatever reasonable method the University may deem expedient.

9.01.2

If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Design Professional's services and expenses made necessary thereby, the remaining balance shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the University. The amount to be paid to the Contractor or University, as the case may be, shall be certified by



the Design Professional, upon application, and this obligation for payment shall survive termination of the Contract. The Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss or consequential damages arising out of or resulting from such termination. However, the University shall be entitled to retain whatever amount is remaining unpaid to the Contractor in order to correct the cause for termination; such action is in addition to any other right or remedy which the University may have.

9.02 Suspension by the University for Convenience

9.02.1

The University 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 University may determine.

9.02.2

An adjustment shall be made for increases in the Contract Sum and/or Time of Completion of the Contract, including profit on the increased cost of performance, caused by suspension, delay or interruption. 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 this Contract. The Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss or consequential damages arising out of or resulting from such termination.

Adjustments made in the cost of performance may have a mutually agreed fixed or percentage fee.

9.03 Termination By The University For Convenience

9.03.1

The University, with or without cause, may terminate all or any portion of the services by the Contractor under this Agreement, upon giving the Contractor 30 days written notice of such termination. In the event of termination, the Contractor shall deliver to the University all reports, estimates, schedules, subcontracts, Contract assignments, purchase order assignments, and other documents and data prepared by it, or for it, pursuant to this Agreement.

9.03.2

Unless the termination is for cause, the Contractor shall be entitled to receive only the payments provided for in Article 8, pro-rated to the date of termination (including payment for the period of the 30 day notice) plus reimbursement for approved and actual costs and expenses incurred by the Contractor to the date of termination. Prior to payment, the Contractor shall furnish the University with a release of all claims against the University. The Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss or consequential damages arising out of or resulting from such termination.

9.04 Termination By The Contractor

9.04.1

The Contractor may terminate the Contract if the Work is stopped for a period of 60 days through no act or fault of the Contractor or a subcontractor, sub-subcontractor or their agents or employees or any other



persons performing portions of the Work under Contract with the Contractor, for any of the following reasons: (1) issuance of an order of a court or other public authority having jurisdiction; (2) an act of government, such as a declaration of national emergency, making material unavailable; (3) because the Design Professional has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification, or because the University has not made payment on a Certificate for Payment within forty-five (45) days of the time stated in the Contract Documents; (4) if repeated suspensions, delays or interruptions by the University 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.

If one of the above reasons exists, the Contractor may, upon fourteen (14) additional days' written notice to the University and Design Professional, terminate the Contract and recover from the University payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead and profit.

9.04.2

If the Work is stopped for a period of 60 days through no act or fault of the Contractor or a subcontractor or their agents or employees or any other persons performing portions of the Work under Contract with the Contractor due to University actions or inaction, the Contractor may, upon fourteen additional days' written notice to the University and the Design Professional, terminate the Contract and recover from the University as provided in Subparagraph 9.03.2

10.00 MISCELLANEOUS

10.01

These Contract Documents supersede all previous agreements between the University and the Contractor concerning this Work.

10.02

No action or failure to act by the University shall constitute a waiver of a right afforded it under these General Conditions, nor shall such action or failure to act constitute approval or acquiescence of a breach of these General Conditions, except as may be specifically agreed in writing.

10.03

The invalidity or unenforceability of any provision of these General Conditions shall not affect the validity or enforceability of any other provision.

-End of General Conditions for Construction-



WAYNE STATE
UNIVERSITY

USB Roof & Structure Repairs
WSU Project No. 060-313960

SUPPLEMENTARY GENERAL CONDITIONS
OF
CONSTRUCTION

Facilities Planning & Management - Design & Construction Services
Wayne State University

Complete Documents can be downloaded at

http://www.forms.procurement.wayne.edu/RFPs/Supplementary_General_Conditions_General_Contractor_1-3-2017.docx

SUPPLEMENTARY GENERAL CONDITIONS OF CONSTRUCTION

Where any article of the General Conditions of the Contract for Construction is supplemented in these Supplementary General Conditions, the original article shall remain in full force and effect and all supplementary provisions shall be considered as added thereto. Where any such article is modified, superseded or deleted here, provisions of such article not so specifically modified, superseded or deleted shall remain in full force and effect.

4.00 RESPONSIBILITIES OF THE PARTIES

Add the following to 4.02.3

.1 Temporary Facilities

.a The Contractor shall be responsible for arranging and providing general services and temporary facilities as specified herein and as required for the Design Professional, the University, all Subcontractors, Separate Contractors and Contractor's staff for the proper and expeditious prosecution of the Work, including, but not limited to, temporary offices and toilets; temporary storage; temporary electrical lighting and power; temporary voice and data communications, temporary water; temporary enclosures; temporary heating and ventilation; temporary openings; material hoists; temporary ladders, ramps and runways; temporary fire protection, protective coverings; temporary fire protection, protective coverings; and construction sign(s). The Contractor shall, at its own expense but included within the Cost of the Work, make all temporary connections to utilities and services in locations acceptable to the University, Design Professional and local authorities having jurisdiction thereof; furnish all necessary labor and materials, and make all installations in a manner subject to the acceptance of such authorities and the Design Professional; maintain such connections; remove the temporary installation and connections when no longer required; and restore the services and sources of supply to proper operating conditions.

.b The Contractor shall make all arrangements with the University and/or the local electrical utility company for temporary electrical service to the Site, shall provide all equipment necessary for temporary power and lighting, and shall pay all charges for this equipment and installation thereof. The electrical service shall be of adequate capacity for all construction tools and equipment without overloading the temporary facilities and shall be made available to all trades. The Contractor shall furnish, install and maintain a temporary lighting system to satisfy minimum requirements of safety and security.

.c Temporary weathertight enclosures and temporary heating shall be provided by the Contractor as required pursuant to the Construction Schedule or Master Project Schedule to complete the Work on or before the Completion Date, to make the building weathertight and suitable working conditions for the construction operations of all trades. Under no circumstances shall the temperature be allowed to reach a level which will cause damage to any portion of the Work which may be subject to damage by low temperatures. Unless otherwise indicated in the Construction Documents, the Contractor shall pay for all fuel, maintenance and attendance required in connection with the portable unit heaters without additional cost or expense to University. Any surface, interior or exterior, damaged by the use of these space heaters shall be replaced by new materials or be refinished to the satisfaction of the Design Professional and University without additional cost to the University.

.d All temporary equipment and conduits for same shall be in accordance with the applicable provisions of the governing codes. All temporary wiring and power conduits shall be maintained in a safe manner and utilized so as not to constitute a hazard to persons or property. All temporary



equipment, wiring and conduits shall be completely removed after they are no longer necessary and prior to completion. At the conclusion of use or at the conclusion of the project, any materials or products purchased for the temporary facilities and temporary utilities and paid for, either directly or indirectly, by the University shall become the property of the University and shall, at the option of the University, be delivered to the University's designated location.

.e Where temporary facilities and associated utilities, and for utilities used in performance of this Agreement can be reasonably provided from existing University services, the University shall bear the cost of such utility consumption. However, for conditions that require the Contractor to use electrical generators or equipment fueled by an independent fuel source, the Contractor shall bear all such costs.

Add the following to 4.02.12

.1 Safety and Protection

.a Contractor shall provide fences, pedestrian walks, barriers, etc. to ensure safety of the general public and Contractor's personnel or as directed by University.

.b Contractor will provide perimeter protection at wall and floor openings, elevator shafts, stairwells, and floor perimeters in accordance with MIOSHA requirements.

.c Combustible rubbish shall be removed daily and shall not be disposed of by burning on site. The entire premises and area adjoining and around the operation shall be kept in a safe and sanitary condition and free of accumulation of trash, rubbish, nuts, bolts, small tools, and other equipment not in use. Contractor is responsible to provide trash containers and fund the removal/disposal of construction debris and general trash.

.d Contractor will regularly ensure that 1) excess material/trash are removed from work sites; 2) passageways (e.g., sidewalks, hallways) are cleared of obstructions; 3) equipment is shut down and secured; and 4) lighted barricades are erected where necessary.

.e All existing means of egress, including stairways, egress doors, panic hardware, aisles, corridors, passageways, and similar means of egress shall, at all times, be maintained in a safe condition and shall be available for immediate use and free of all obstructions.

.f The space under the temporary trailer shall not be used for the storage or placement therein of flammable gases, liquids, or gas and liquid fuel powered equipment. This area shall be kept free of accumulations of any rubbish or trash.

.g In temporary trailers, all exit doors shall be open for egress whenever the unit is occupied. Draw bolts, hooks and other similar locking devices shall be prohibited on all egress doors.

.h On site storage of combustible or flammable liquids shall be limited to one day supply. Indoor storage of propane containers is prohibited.

.i Prior to working in confined spaces on campus, the Contractor must have its written Confined Spaces Program and Permit System reviewed by the University and the documents must meet minimum acceptable standards under the current MIOSHA regulation(s). The Contractor must provide its own atmospheric testing, personal protection, ventilating and rescue equipment as required. The Contractor should seek information from University on any known hazards of the confined spaces to be entered. All manholes and utility tunnels are considered confined spaces.



.j Compressed gas cylinders belonging to Contractor must be properly segregated and secured (with chains or similarly reliable restraining devices) to wall or floor mounted support systems, cylinder storage racks etc., when not in transit. Protective caps must be in place during transit or when not in use.

.k Contractor must follow all of OSHA's lockout/tagout requirements of 29 CFR 1910.147, provide its own lockout/tagout supplies, and be able to demonstrate that its employees have received formal instruction in "lock-tag-try" procedures. Copies of Contractor's written Lockout/Tagout Program shall be made available to the University upon request.

.l Contractor may not use any University sinks, drains or catch basins for the washing of any equipment, tools or supplies, or the disposal of any liquids, (excluding consumable products and hand-soap/water) without the express permission of University. This restriction applies to all sinks (including water fountains) in laboratories, offices and maintenance areas. Additionally, no polluting or hazardous liquids (such as motor oils, cleaners, solvents, paints, diesel fuels, antifreeze, etc.) may be drained onto roads, parking lots, ditches, wetlands, dirt piles or other soil, or into storm or sanitary sewers.

.m Contractor transporting hazardous materials (e.g. reclaimed materials, chemicals, fuels, oils, concrete) to and from campus must follow all applicable Department of Transportation [State or Federal] regulations. This includes proper shipping papers, placarding, material segregation and weight limits.

.n Contractor is also responsible for the proper collection, labeling, transporting, manifesting and disposal of polluting or hazardous wastes such as solvents, paints, oil or antifreeze (and rags contaminated with any of these materials) which are the result of Contractor's activities, as required by State and Federal laws and regulations. Copies of all manifests should remain available for University review upon request. Under no circumstances may hazardous wastes be disposed of in University-owned dumpsters, waste containers, drains or sewers, or drained onto roads, parking lots, ditches, wetlands, dirt piles or other soil.

.o Neither the University nor the Design Professional is responsible for conducting safety inspections or observations, but may make recommendations concerning safety to the Contractor.

.p Fire Protection

(1) All reasonable precautions shall be taken against fire throughout all the Contractor's and Trade Contractors' operations. Flammable material shall be kept at an absolute minimum. Any such materials shall be properly handled and stored.

(2) Construction practices, including cutting, welding and grinding, and protection during construction shall be in accordance with the applicable published standards. During such operations the Contractor shall provide a fire watch person. The University requires a "Hot Work" permit for such activities. The Contractor shall provide a sufficient number of approved portable fire extinguishers, distributed about the Project and in cold weather, non-freeze type portable fire extinguishers shall be used.

(3) Gasoline and other flammable liquids shall be stored in and dispensed from Underwriter's Laboratories listed safety containers in conformance with the National Board of Fire Underwriters recommendations and applicable State laws. Storage, however, shall not be within or immediately adjacent to the building. Storage shall be in a lockable, non-combustible, suitably rated cabinet or structure no less than 25 feet distant from any University building.



- (4) The Contractor shall schedule the Work so that the permanent standpipe system shall be installed and made operable at the earliest possible date.
- 4) All tarpaulins that may be used for any purpose during construction of the Work shall be made of material which is water and weather resistant and fire retardant treated. All tarpaulins shall be Underwriters' Laboratories labeled with flame spread rating of fifteen (15) or less and shall be approved by the University's Representative prior to use.

Add the following to 4.02.13

Hazard Communication: University requires the Contractor to be in full compliance with all applicable Federal and State of Michigan regulations regarding Material Safety Data Sheets ("MSDS"). Upon request, copies of these MSDS must also be provided to the University no less than two weeks prior to the onset of activities. Failure to submit MSDS may result in suspension of Work activities until the MSDS are obtained. If Contractor is to work with hazardous products, it shall notify and update the Project Manager of a) proposed work schedules, b) what to expect in terms of noises/odors, and c) how to access MSDS. The Contractor must also be able to demonstrate that its employees have received "Haz Com" (i.e. Michigan Right-to-Know), and thereby possess a broad understanding of MSDS language. Contractor-owned chemical containers must be labeled with the product name and hazards.

Hazardous Materials: In addition to complying with the Michigan Right-to-Know Law, the Contractor must use and store hazardous materials in accordance with all local, state and federal regulations. Special attention must be paid to the segregation of incompatible materials and the handling/storage of flammable and/or volatile materials. At the end of each work day, hazardous materials must be properly secured, stored in MIOSHA approved containers, and placed in locations authorized by the University or removed from University's property.

Add the following to 4.02.21

.1 Excavation Policy

The policy prescribed herein shall be adhered to for all earth excavation, manual or power, on the University campus that penetrates the surface of the soil by a depth of 6 inches or greater.

.a Non-emergency Situation

- (1) In non-emergency situations (i.e., scheduled maintenance or construction) the Contractor shall contact the University a minimum of seven days in advance of the scheduled excavation.
- (2) The Contractor shall contact Miss Dig, as defined by Public Act 174 of 2013, being MCL 460.721 – MCL 460.733, at least three full business days prior to the scheduled excavation, to ascertain and stake the actual location for all utilities within 50 feet of the limits of the proposed excavation. Actual staking shall be performed not more than three (3) days prior to the excavation.
- (3) Excavation shall commence only with the approval of the University Representative after a complete examination of the site utility drawings and a field observation of the staked site.

.b Emergency Situation

1. In an emergency situation (i.e., loss of services on campus or to a building), the Contractor shall immediately contact the University Representative, examine the site utility drawings to determine the potential interferences, and contact Miss Dig and private stakers, if appropriate,



to ascertain and stake the actual location of all utilities within 50 feet of the limits of the proposed excavation. The Contractor shall also immediately contact the local natural gas supplier in addition to Miss Dig, upon a natural gas line failure.

2. Contact the University's Police Department at the emergency number: (313) 577-2222.
3. Excavation shall recommence only with the approval of the University's Representative who will grant approval only after a complete examination of the site utility drawings and a field observation of the staked site and clearance from the utility and University Police Department.

.c Pumping and Draining

The Contractor shall provide and maintain a temporary drainage system and pumping equipment as required to keep all excavation areas within the Site free from water from any source. As the Work progresses, all water shall be removed from basement areas, tunnels, pits, trenches and similar areas as required for proper performance of the Work and to prevent damage to any part of the construction utility. Permanent sump pumps shall not be used for this purpose; however, the Contractor may install temporary pumps in the sump pits until the permanent pumps are installed, providing that it cleans sump pits and drain lines satisfactorily after temporary use. The Contractor shall provide and maintain all pumping and draining equipment as required for the installation of all underground piping and utility conduit systems. Pumping and draining shall be performed in a manner to avoid endangering concrete footings or any adjacent construction or property. Such methods shall be subject to the review of the Design Professional.

.d Post-Excavation

- (1) Provide appropriate pipe protection (wraps, and/or cathodic protection) as originally installed.
- (2) Provide backfill material and compaction in 12-inch lifts to a minimum 95% Maximum Dry Density or higher as required by the Specifications.
- (3) Backfill material shall be as specified; or engineered fill free of all deleterious materials and rubbish of any type. Reuse of excavated material, unless otherwise specifically noted on the drawings, is unacceptable.
- (4) Provide plastic tape trace 24" (12" for shallow trenches) above all utilities indicating utility type by Miss Dig color code and name defined as follows:

<u>Utility</u>	<u>Color</u>	<u>Lettering</u>
Electric	Red	Elect
Oil/Natural Gas	Yellow	Gas
Telephone & Fiber Optic	Orange	Tele
Cable TV	Brown	TV
Water	Blue	Water
Steam	Yellow	Steam
Sewer	Green	Sewer

- (5) Return grade to pre-excavation condition.

Add the following to 4.05.1

The insurance furnished by the Contractor under this Article 4.05.1 shall provide coverage not less than the following:



- .1 Workers compensation:
 - (a) State: Statutory
 - (b) Applicable Federal Statutory
 - (c) Employer's Liability
 - \$1,000,000 per Accident
 - \$1,000,000 Disease, Policy Limit
 - \$1,000,000 Disease, Each Employee
- .2 Commercial General Liability (including Premises-Operations; Independent Contractors' Protective; Products and Completed Operations; Broad Form Property Damage):
 - (a) Bodily Injury:
 - \$1,000,000 Each Occurrence
 - \$2,000,000 Aggregate
 - (b) Property Damage:
 - \$1,000,000 Each Occurrence
 - \$2,000,000 Aggregate
 - (c) Product and Completed Operations to be maintained for three (3) years after final payment
 - \$2,000,000 Aggregate
 - (d) Property Damage Liability Insurance shall provide X,C and U coverage.
 - (e) Broad Form Property Damage Coverage shall include Completed Operations.
- .3 Contractual Liability:
 - (a) Bodily Injury:
 - \$1,000,000 Each Occurrence
 - \$1,000,000 Aggregate
 - (b) Property Damage:
 - \$1,000,000 Each Occurrence
 - \$1,000,000 Aggregate
- .4 Personal Injury, with Employment Exclusion deleted (or through a separate employment practice insurance policy):
 - \$1,000,000 Aggregate
- .5 Business Auto Liability (including owned, non-owned and hired vehicles):
 - (a) Bodily Injury
 - \$1,000,000 Aggregate
 - \$1,000,000 Each Occurrence
 - (b) Property Damage
 - \$1,000,000 Each Occurrence
- .6 If the General Liability coverages are provided by a Commercial Liability policy, the:



- (a) General Aggregate shall be not less than \$1,000,000 and it shall apply, in total, to this Project only.
- (b) Fire Damage Limit shall be not less than \$1,000,000 on any one Fire.
- (c) Medical Expense Limit shall be not less than \$1,000,000 on any one person.

.7 Umbrella Excess Liability:

\$5,000,000 over primary insurance minimum; or a greater amount specified in the Contract Documents
\$10,000 retention for self-insured hazards each occurrence

.8 Builder's Risk Insurance in the amount equal to the Contract Sum.

.9 Professional Liability (Errors and Omissions) in an amount specified in the Contract Documents.

Any deductible or self-insured reserve shall not be refunded to the Contractor from project contingency or other project funds.

Add the following to 4.12

Elevator shafts, electrical closets, pipe and duct shafts, chases, furred spaces and similar spaces which are generally unfinished, shall be cleaned by the Contractor and left free from rubbish, loose plaster, mortar drippings, extraneous construction materials, dirt and dust before preliminary inspection of the Work.

All areas of the Project in which painting and finishing work is to be performed shall be cleaned throughout just prior to the start of this work, and these areas shall be maintained in satisfactory condition for painting and finishing. This cleaning shall include the removal of trash and rubbish from these areas; broom cleaning of floors; the removal of any plaster, mortar, dust and other extraneous materials from all finished surfaces, including but not limited to, all exposed structural steel, miscellaneous metal, woodwork, plaster, masonry, concrete, mechanical and electrical equipment, piping, duct work, conduit, and also all surfaces visible after all permanent fixtures, induction unit covers, convactor covers, covers for finned tube radiation, grilles, registers, and other such fixtures or devices are in place.

In addition to all cleaning specified above and the more specific cleaning which may be required, the Project shall be prepared for occupancy by a thorough final cleaning throughout including washing or cleaning of all surfaces on which dirt or dust has collected. Glass and curtain wall shall be washed and cleaned on both sides by a window cleaning subcontractor specializing in such work. Contractor shall, at University's request, delay such washing of exterior surfaces to such time as requested by University. Recleaning will not be required after the Work has been inspected and accepted unless later operations of the Contractor, in the opinion of the University, make re-cleaning of certain portions necessary.

5.00 INTERPRETATION OF AND ADHERENCE TO CONTRACT REQUIREMENTS

Add the following to 5.04.1



.1 Contractor Requirements

- .a Signature: Each item submitted shall be thoroughly reviewed by the Contractor and have a stamp or note describing the Contractor's action, signed by the person authorized by the Contractor to do the checking with that person's name clearly printed.
- .b Contractor Responsibility: Contractor shall review each submittal for completeness, conformance to the Contract Documents and coordination with other parts of the Work and the Construction Schedule. By providing and submitting to the Design Professional shop drawings, product data, warranties and samples, the Contractor is representing that he or his Subcontractor, has determined and verified (a) the availability of all materials, and (b) field measurements and field construction criteria related thereto, and (c) that he has checked and coordinated the information contained within such submittals with the requirements of the Work, the Contract Documents and the Construction Schedule and that such shop drawings, samples, warranties and data conform to the Contract Documents.
- .c Limited Acceptance by University and Design Professional: Acceptance is for general design only. Quantities, size, field dimensions and locations are some of the required characteristics which are not part of the acceptance and will not be checked. Accordingly, the limited acceptance shall in no way relieve the Contractor from his obligation to conform his work to required characteristics and to the requirements of the Contract Documents.
- .d Delays: The Design Professional may return incomplete submittals with no action taken. The Contractor shall have no claim for any damages or for an extension of time due to delay in the Work resulting from the rejection of materials or from the rejection, correction, and resubmittal of Shop Drawings, samples and other data, or from the untimely submission thereof.

.2 Approvals

The Design Professional's approval shall not indicate approval of dimensions, quantities or fabrication processes unless specific notations are made by the Design Professional regarding same. The Design Professional will check one of the following notations on the Shop Drawing and Sample Review Stamp:

- .a "REVIEWED-NO EXCEPTIONS NOTED", indicating final action by the Design Professional. When reviewing resubmitted shop drawings the Design Professional assumes that there are no revisions from the previous submittal, except as provided by 5.04.1 and his review of resubmittals is only for the corrections requested with the approval of the balance of the shop drawing being based on the original submission. Where the Contractor directs specific action to revisions, as provided by 5.04.1 the approval includes these also.
- .b "REVIEWED WITH CORRECTIONS NOTED", indicating final action by the Design Professional with the same conditions as "REVIEWED-NO EXCEPTIONS NOTED". Unless he takes exception to the corrections noted, the Contractor may begin that portion of the Work for which the shop drawing was required.
- .c "REVISE AND SEND RECORD COPY", requiring that the Design Professional be sent a copy of the revised shop drawing in accordance with the noted corrections, at the same time it is issued for the Work.
- .d "NOT APPROVED-RESUBMIT", indicating that the Contractor shall not begin that portion of the Work until the reason indicated for disapproval has been corrected and the revised shop drawing submitted, reviewed and approved by the Design Professional.

- .e "NO ACTION REQUIRED", indicating that Contract Documents do not require the Design Professional to review or take any action with this submittal.
- .f Where more than one action has been checked, each shall apply to that portion of the shop drawing for which the action is indicated.

8.00 PAYMENT AND COMPLETION

Add the following to 8.01

8.01.1 Monthly Payment Applications

At a meeting mutually agreed upon between the University's Representative and the Contractor, but no less than monthly, the Contractor shall distribute, in triplicate, draft copies of the proposed Payment Application for review and comment. The review, comment and mutual concurrence will be an agenda item at that meeting. The Contractor will prepare the formal Application for submission from the comments made on the Draft and will present the formal application as provided for herein, including all required back-up materials, such as waivers of claim, release of claim on bond, sworn statement, documentation for stored materials, certified payroll reports and other documents required by the University Representative.

8.01.2 Offsite Materials

If an Application for Payment is made for materials not installed in the Work, but suitably stored off-site at a location acceptable to the University's Representative, such application shall be accompanied by legally acceptable paid invoices or conditional bills of sale and copies of delivery tickets, signed by the Contractor, indicating the Contractor verified that the materials shown on the delivery tickets are at the location accepted by the University and are adequately insured. Failure of the Contractor to furnish paid invoices, conditional bills of sale and proof of insurance shall be cause for withholding such amounts from payment until such paid invoices or bills of sale have been received by the University. The University reserves the right to examine the stored items prior to payment.

Add the following to subparagraph 8.03

The following submittals shall be bound in three (3) sets, plus one electronic file of all materials:

.1 Project Closeout Documents

- .a The Contractor shall submit to the Design Professional, a written guarantee, which shall be in accordance with Section 8.04 and such additional guarantees, in writing, as are required by the Specifications.
- .b The Contractor shall submit complete instruction for the care and maintenance of all finish materials under the contract, including, but not limited to floor finishes and coverings, wainscot and wall finishes, acoustical treatment, metal finishes, painted surfaces, flooring, hardware, and finishes on mechanical and electrical equipment. Instructions shall contain the manufacturer's or supplier's recommendations with respect to cleaning agents, preservative treatment and such other instructions as may be beneficial to the maintenance, usage, appearance and durability of the product. The recommendations shall further contain cautions on the use of certain cleaners and coatings which may be detrimental to the product.



- .c The Contractor shall prepare and submit operating and maintenance instructions, coordination drawings, and shop drawings for all mechanical and electrical equipment, and other special items, as called for in the specifications.
- .d All of the above described documents shall be checked by Contractor for conformance with the specifications and shall be submitted in uniform size, bound and indexed for cross-reference.
- .e The Contractor shall also submit "As-Built" drawings as specified in Section 4.11.
- .f Copies of all "Attic Stock" transmittals signed by appropriate University personnel accepting the attic stock material.

.2 Project Closeout Training

- a. The University and the Contractor will coordinate, schedule and present formal training for University personnel for all equipment, systems, devices, and building features.
- b. Training shall be scripted to include all important aspects of the equipment and its installation and maintenance. Trainers shall be suitably prepared and experienced in the features of the equipment and the equipment's installation within the project.
- c. The Contractor, all product vendors, subcontractors, suppliers and materialmen shall consent to and participate in the recording of the training as determined by the University and the Contractor.
- d. The University may supplement training with outside providers to meet the training requirements of the project should a vendor, subcontractor, or supplier fail to provide the required training. The University shall be reimbursed by the Contractor for any such costs for supplemental training.



DRAWINGS

The Technical Specifications dated **July 9, 2018** and the following List of Drawings represent the scope of work as defined in the Contract Documents from Article 4.

DRAWINGS

Drawing No.:	Description
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GENERAL REQUIREMENTS

GENERAL

A. CONTRACTOR'S RESPONSIBILITY

It is not the responsibility of the Architect/Engineer or Owner's Representative to notify the Contractor or subcontractors when to commence, to cease, or to resume work; nor in any way to superintend so as to relieve the Contractor of responsibility or of any consequences of neglect or carelessness by him or his subordinates. All material and labor shall be furnished at times best suited for all Contractors and subcontractors concerned, so that the combined work of all shall be properly and fully completed on the date fixed by the Contract.

The Contractor shall be responsible for all items contained in both the specifications and on the drawings for all trades. He shall be responsible for the proper division of labor according to current labor union agreements regardless of the division of responsibility implied in the contract documents.

B. CODES AND STANDARDS

Reference to standard specifications for workmanship, apparatus, equipment and materials shall conform to the requirements of latest specifications of the organization referenced, i.e., American Society for Testing Materials (ASTM), Underwriters Laboratories, Inc. (UL), American National Standards Institute, Inc. (ANSI), and others so listed in the Technical Specifications.

C. PERMITS, FEES AND NOTICES

See Supplementary General Conditions.

D. MEASUREMENTS

Before proceeding with each Work Item, Contractor shall locate, mark and measure any quantity or each item and report quantities to Engineer. If measured quantities exceed Engineer's estimate, Contractor shall obtain written authorization to proceed from Owner before executing Work required for that Work Item.

Measurement of quantities for individual Work Items will be performed by Contractor and reviewed by Engineer. Coordinate measurements with inspection as required in Section "Coordination."

Cost of Work included in Work Item for quantities as indicated in Contract Documents shall be included in Base Bid.

1. Additions to or deductions from lump sum price for quantities of each Work Item added to or deducted from Work respectively shall be at unit prices indicated in Bid Form and shall constitute payment or deductions in full for all material, equipment, labor, supervision and incidentals necessary to complete Work.

E. CONTRACTOR'S MEASUREMENTS

Before ordering material, preparing Shop Drawings, or doing any work, each Contractor shall verify, at the building, all dimensions which may affect his work. He assumes full responsibility for the accuracy of his figures. No allowance for additional compensation will be considered for minor discrepancies between dimensions on the drawings and actual field dimensions.

F. CONTINUITY OF SERVICE (*Revised 3-26-2012*)

Continuity of all existing services in the building shall be maintained throughout the construction period. Where it is necessary to tie into the existing electrical service, water or waste systems, it shall be done as directed by the Architect/Engineer. This Contract shall also provide temporary lines or bypasses that may be required to maintain continuous service in the building. All utility shutdowns must be approved by the Owners Representative / Project Manager, not less than **7 business days** prior to the event, so that proper notification can be posted.



G. SUBMITTALS

All submittals (except Shop Drawings) and samples required by the Specifications shall be submitted in triplicate unless otherwise specified for a particular item under an individual Specification Section.

Each sample shall be clearly identified on a tag attached, showing the name of the Project Consultant, the project number and title, the names of the Contractor, manufacturer (and supplier if same is not the manufacturer), the brand name or number identification, pattern, color, or finish designation and the location in the work.

Each submittal shall be covered by a transmittal letter, properly identified with the project title and number and a brief description of the item being submitted.

Contractor shall be responsible for all costs of packing, shipping and incidental expenses connected with delivery of the samples to the Project Consultant or other designated address.

If the initial sample is not approved, prepare and submit additional sets until approval is obtained.

Materials supplied or installed which do not conform to the appearance, quality, profile, texture or other determinant of the approval samples will be rejected, and shall be replaced with satisfactory materials at the Contractor's expense.

H. GENERAL/STANDARD ELECTRONIC EQUIPMENT AND INFRASTRUCTURE REQUIREMENTS (*Revised 11-2008*)

1. Compliance with WSU Standards for Communications Infrastructure

- A. All applicable work, products, materials and methods shall comply with the latest version of the "WSU Standards for Communications Infrastructure" except as where noted.
- B. This document is available at the following website/URL: <https://computing.wayne.edu/docs/wsu-communications-standards.pdf>

2. Automation System Program Code

- A. All automation system uncompiled and compiled program codes, source codes, custom modules, graphical user interface screen shots and any other automation system programming data and material (Program Code) shall be provided to the UNIVERSITY in hard copy and on CD Rom in an unencrypted format acceptable to the UNIVERSITY.
- B. Copyright for the Program Code shall be assigned to the UNIVERSITY for purposes of system maintenance.

PROTECTION OF OCCUPANCY (*Revised 3-2006*)

A. FIRE PRECAUTIONS

Take necessary actions to eliminate possible fire hazards and to prevent damage to construction work, building materials, equipment, temporary field offices, storage sheds, and other property.

During the construction, provide the type and quantity of fire extinguishers and fire hose to meet safety and fire prevention practices by National Fire Protection Association (NFPA) Codes and Standards (available at <http://www.nfpa.org/>)

In the event that construction includes "hot work", the contractor shall provide the Owner's Representative with a copy of their hot work policy, procedures, or permit program. No hot work activity (temporary maintenance, renovation, or construction by operation of a gas or electrically powered equipment which produces flames, sparks or heat that is sufficient to start a fire or ignite combustible materials) shall be performed until such documents are provided. During such operations, all highly combustible or flammable materials shall be removed from the immediate working area, and if removal is impossible, same shall be protected with flame retardant shield.



Not more than one-half day's supply of flammable liquids such as gasoline, spray paint and paint solvent shall be brought into the building at any one time. Flammable liquids having a flash point of 100 degrees F. or below which must be brought into the building shall be confined in an Underwriters Laboratories (UL) labeled safety cans. The bulk supply of flammables shall be stored at least 75 feet from the building and other combustible materials. Spigots on drums containing flammable liquids are prohibited on the project site. Drums shall be equipped with approved vented pumps, and be grounded and bonded.

Only a reasonable working supply of combustible building materials shall be located inside the building.

All oil-soaked rags, papers, and other similar combustible materials shall be removed from the building at the close of each day's work, or more often if necessary, and placed in metal containers, with self-closing lids.

Materials and equipment stored in cardboard cartons, wood crates or other combustible containers shall be stored in an orderly manner and accessibly located, fire-fighting equipment of approved types shall be placed in the immediate vicinity of any materials or equipment stored in this type of crate or carton.

No gasoline, benzene, or like flammable materials shall be poured into sewers, manholes, or traps.

All rubbish shall be removed from the site and legally disposed of. Burning of rubbish, waste materials or trash on the site shall not be permitted.

The contractor shall be responsible for the conduct of employees relative to smoking and all smoking shall be in the area designated by the Architect/Engineer.

B. GENERAL SAFETY AND BUILDING PRECAUTIONS

Provide and maintain in good repair barricades, railings, etc., as required by law for the protection of the Public. All exposed material shall be smoothly dressed.

At dangerous points throughout the work environment provide and maintain colored lights or flags in addition to above guardrails.

Isolate Owner's occupied areas from areas where demolition and alteration work will be done, with temporary, dustproof, weatherproof, and fireproof enclosures as conditions may require and as directed by the Architect/Engineer.

Cover and protect furniture, equipment and fixtures to remain from soiling, dust, dirt, or damage when demolition work is performed in rooms or areas from which such items have not been removed.

Protect openings made in the existing roofs, floors, and other construction with weatherproof coverings, barricades, and temporary fire rated partitions to prevent accidents.

Repair any damage done to existing work caused by the construction and removal of temporary partitions, coverings, and barricades.

The Contractor will be held responsible for all breakage or other damage to glass up to the time the work is completed.

Provide protection for existing buildings, interior and exterior, finishes, walls, drives, landscaping, lawns (see below), etc. All damages shall be restored to match existing conditions to the satisfaction of the Architect/Engineer.

The Contractor and Owner will define the anticipated area of lawn damage at the project Pre-Construction Meeting. Whether the lawn is sparse or fully developed, any lawn damaged due to the Contractor's work will be replaced with sod by the University. The University's unit cost of \$10.00 per square yard and landscaping at a rate of 1.5 times the cost of the sod repairs, the full cost of which will be assessed against the Contractor. At the completion of the project, a deductive Change Order reflecting this cost will be issued.

The Contractor is to include an allowance in his bid for this corrective work.



C. INTERFERENCE WITH OWNER'S OPERATIONS

The Owner will be utilizing the Building Facilities to carry on his normal business operation during construction. The Contractor shall schedule performance of the work necessary to complete the project in such a way as to interfere as little as possible with the operation during construction. The Contractor shall schedule performance of the work necessary to complete the project in such a way as to interfere as little as possible with the operation of the Owner.

Work which will interfere with the Owner's occupancy, including interruptions to the Owner's mechanical and electrical services, and essentially noisy operations (such as jackhammering) shall be scheduled in advance. The schedule of alterations shall be approved by the Architect/Engineer and the work shall be done in accordance with the approved schedule.

It is understood that the work is to be carried through to completion with the utmost speed consistent with good workmanship and to meet the construction schedule.

The Contractor shall begin work under the Contract without delay upon receipt of the fully-executed contract and shall substantially complete the project ready for unobstructed occupancy and use of the Owner for the purposes intended within the completion time stated in the contract.

The Contractor shall, immediately upon award of contract, schedule his work and expedite deliveries of materials and performance of subcontractors to maintain the necessary pace to meet the construction schedule.

CONTRACTOR'S REPRESENTATION AND COORDINATION

A. FIELD SUPERINTENDENT

Contractor shall assign a full time project manager/superintendent for the duration of the project. This person shall be experienced and qualified in all phases of the work and shall be present at the site during Contractor's working hours. The project manager shall have Contractor's full authority to represent Contractor in all routine operations including payment, changes to the work, and scheduling. Contractor shall not re-assign this individual without prior written permission of the Owner.

B. MEETINGS

When directed by the Architect/Engineer, meetings shall be held for the purpose of coordinating and expediting the work. The invited contractors or subcontractors will be required to have qualified representatives at these meetings, empowered to act in their behalf.

C. COORDINATION

The Contractor shall also provide a staff adequate to coordinate and expedite the work properly and shall at all times maintain competent supervision of its own work and that of its subcontractors to insure compliance with contract requirements.

The Contractor shall be solely responsible for all construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the work under the Contractor.

D. CONSTRUCTION SCHEDULE

The Construction Schedule shall be prepared after the award of contract. Soon after, a pre-construction meeting is held with the Owner and the Architect/Engineer to determine the areas to which the Contractor will be allowed access at any one time.

The Contractor is alerted to the fact that areas in which he will be working will be occupied by students and employees of the University as well as the general public. The Contractor's access, to and from the project site, will be confined to limited areas so as not to unduly disrupt the normal activities of the University.

TEMPORARY FACILITIES



A. **GENERAL**

The following temporary facilities descriptions represent standard conditions. Verify accuracy with Architect/Engineer at time of bids.

B. **CONTRACTOR'S OFFICE**

Provide field offices as required. Locate temporary field offices on site where directed by Architect/Engineer.

Appearance and location of field offices shall be approved by the Architect/Engineer.

Provide for all other administrative facilities and storage off the Owner's property.

C. **STORAGE OF MATERIALS**

All materials shall be stored in areas designated by the Architect/Engineer. All stored materials shall be arranged for the minimum disruption to occupants and to allow full access to and throughout the building. Materials stored outdoors shall be neat and orderly and covered to prevent damage or vandalism.

D. **PARKING**

1. **GENERAL**

University parking regulations will be strictly enforced.

Maintain Owner's parking areas free of dirt and debris resulting from operations under the contract.

2. **STANDING AND UNLOADING/LOADING VEHICLES**

All Contractors are to call Wayne State University Public Safety at 577-2222, and give at least 24 hours advance notice that they have vehicles that must be at the job site.

Vehicles will be permitted at the project site only as long as the vehicles are needed for loading/unloading, and must be immediately moved upon completion.

All unauthorized and/or unattended standing vehicles will be subject to ticketing and removal by University Police. Towed vehicles may be reclaimed by calling 577-2222, and paying any assessed charges.

3. **COMPLIMENTARY PARKING**

There is no complimentary parking for Contractor's employee vehicles.

4. **WAYNE STATE UNIVERSITY PUBLIC/STUDENT PARKING AREAS**

Public Parking, on a first-come first-served basis is available. Contact the office of the One Card System, at 313.577.9513 for information on availability of parking on a contractual basis.

E. **TOILET FACILITIES**

The Owner's designated existing toilet facilities may be used by workers on the project. Contractor shall maintain such facilities in a neat and sanitary condition.

F. **TELEPHONE USE**

If required, the Contractor shall provide and pay for a temporary telephone within the building for his use and that of his subcontractors.

No use of the Owner's telephone (except pay telephones) will be permitted.



G. ACCESS DEVICES

The Contractor shall furnish and maintain temporary hoists, ladders, railings, scaffolds, runways, and the like as required for safe, normal access to the permanent construction until the permanent facilities are complete. Each trade shall furnish such additional means of access as may be required for the progress and completion of the work. Such temporary access devices shall meet all applicable local, state, and federal codes and regulations.

H. HEAT AND VENTILATION

Provide cold weather protection and temporary heat and ventilation as required during construction to protect the work from freezing and frost damage.

Provide adequate ventilation as required to maintain reasonable interior building air conditions and temperatures, to prevent accumulation of excess moisture, and to remove construction fumes.

Tarpaulins and other materials used for temporary enclosures. Coverings and protection shall be flameproofed.

I. WATER SERVICE

Sources of water are available at the site. The Owner will pay for reasonable amounts of water used for construction purposes.

The Contractor shall provide, at the earliest possible date, temporary connections to the water supply sources and maintain adequate distribution for all construction requirements. The Contractor shall protect sources against damage.

Methods of conveying this water shall be approved by the Architect/Engineer and shall not interfere with the Owner's operations.

J. ELECTRICAL SERVICES

All charges for reasonable amounts of electrical power energy used for temporary lighting and power required for this work will be paid by the Owner.

The Contractor shall provide and maintain any temporary electrical lighting and power required for this work. At the completion of the work, all such temporary electrical facilities shall be removed and disposed of by the Contractor.

Temporary lighting and power shall comply with the regulations and requirements of the National Electrical Code

INSPECTIONS AND TESTS

The Architect/Engineer shall at all times have access to the work wherever it is in preparation or in progress and the Contractor shall provide proper facilities for such access and for observation.

No failure of the Architect/Engineer, during the progress of the work, to discover or reject materials or work not in accordance with the Contract Specifications and Drawings shall be deemed an acceptance thereof nor a waiver of defects therein. Likewise, no acceptance or waiver shall be inferred or implied due to payments made to contractor or by partial or entire occupancy of the work, or installation of materials that are not strictly in accordance with the Contract Specifications and Drawings.

Where tests are specifically called for in the Specifications, the Owner shall pay all costs of such tests and engineering services unless otherwise stated in the contract.

Where tests are not specifically called for in the Specifications, but are required by the Architect/Engineer or Consultant, the Owner shall pay all costs of such tests and engineering services unless the tests reveal that the workmanship or materials used by the Contractor are not in conformity with the Drawings, Specifications, and/or approved shop drawings. In such event, the Contractor shall pay for the tests, shall remove all work and materials so failing to conform and replace with work and materials that are in full conformity.



CLEAN-UP

The Contractor shall at all times keep the Owner's premises and the adjoining premises, driveways and streets clean of rubbish caused by the Contractor's operations and at the completion of the work shall remove all the rubbish, all of his tools, equipment, temporary work and surplus materials, from and about the premises, and shall leave the work clean and ready for use. If the contractor does not attend to such cleaning immediately upon request, the Architect/Engineer may cause such cleaning to be done by others and charge the cost of same to the Contractor.

The Contractor will be responsible for all damage from fire that originates in, or is propagated by, accumulations of rubbish or debris.

All rubbish and debris shall be disposed of off the Owner's property in an approved sanitary landfill site. No open burning of debris or rubbish will be permitted. Job site shall be left neat and clean at the completion of each day's operation.

PROJECT CLOSE-OUT

A. RECORD DRAWINGS

At beginning of job, provide one copy of Working Drawings, and record changes, between Working Drawings and "As Built", including changes made by Addenda, Change Orders, Shop Drawings, etc. These shall be kept up to date. Update to indicate make of all mechanical and electrical equipment and fixtures installed. Keep these Record Prints in good condition and available for inspection by the Architect/Engineer.

Upon completion of the job, turn over to the Architect/Engineer Record Prints of Working Drawings showing all job changes.

B. OPERATING AND MAINTENANCE DATA

Prepare and furnish to the Architect/Engineer three (3) bound copies of "Operating and Maintenance Manual" on all equipment installed under this Contract.

Manual shall include copies of all Manufacturers' "Operating and Service Instructions", including Parts List, Control Diagrams, Description of Control Systems, Operating, Electrical Wiring, and any other information needed to understand, operate and maintain the equipment. The names and addresses of all subcontractors shall be included. These instructions shall be custom-prepared for this job -- catalog cuts will **not** be accepted. Equipment shall be cross-referenced to Section of Specifications and to location shown and scheduled on drawings.

Include Test-Adjust-Balance Report in the Manual.

C. FINAL INSPECTION

Secure final inspections from the State of Michigan as soon as the work is completed and immediately submit such Certificates to the Architect/Engineer.

D. GUARANTEES (See Sections 00510 and 01781)

Guarantees on material and labor from the General Contractor and his subcontractors shall be as required in Sections 00510 and 01781.

E. SWORN STATEMENT AND WAIVER OF LIENS (*revised 4-11-2012*)

Prior to final payment, the General Contractor shall provide a Contractor's Sworn Statement and Full Unconditional Waivers of Liens from all subcontractors for material and labor and from all suppliers who provide materials exceeding \$1,000. Sworn Statements and signed waivers from all Subcontractors must accompany Pay Applications or they will be returned for such documentation prior to approval.

ASBESTOS HAZARD



- A. The contractor shall not start any work in any area that has not been inspected for asbestos by the Owner's Industrial Hygiene Department, or a qualified representative of the Owner and approval is given for work to be done. If asbestos is found, safety measures as recommended by the Owner's Industrial Hygiene Department, or a qualified representative of the Owner, shall be completed, or approval given for work to be done before work is started. The contractor shall not perform any asbestos removal or containment work under the contract.

KEYS

- A. The Owner shall provide the contractor keys on loan to have access to the various spaces in order to complete the contract. Contractor will sign for and be responsible for each key on loan, returnable to Owner upon completion of the contract. In case of any lost keys, the Owner will backcharge the contract \$250.00 for each core change. In the event that a Contractor wants access to a secured area, he shall give the Owner a minimum 48-hour notice.



SUMMARY OF WORK

SUMMARY OF WORK

PROJECT: USB Roof & Structure Repairs

WSU PROJECT NO.: 060-313960

PROJECT MANAGER: Allen Gigliotti

1. EXAMINATION

The Contractor shall visit the site and become familiar with conditions under which he will be working. Also meet with the project manager and review site access, storage areas, etc.

2. Description of Work – Project includes **Repair structure of deck; install roof; repair beams, decking & ramps; install pedestrian and pipe guards; provide storage area for trades..**

3. The building is located at

Wayne State University
5454 Cass Avenue, Detroit, MI 48202
Detroit, Michigan 48202



WAYNE STATE
UNIVERSITY

USB Roof & Structure Repairs
WSU Project No. 060-313960

**PROJECT MANUAL
FOR**

Wayne State University

***UNIVERSITY SERVICES BUILDING ROOF AND STRUCTURE REPAIRS 2018
WSU PROJECT #: 060-313960***

Detroit, Michigan

OWNER:

***Wayne State University
Design & Construction Services
5454 Cass Avenue
Detroit, MI 48202***

PREPARED BY:

***WGI
5136 Lovers Lane, Suite 200
Kalamazoo, MI 49002***

WGI PROJECT NO. 24183210

**CONTACT: Mark Sampson
PHONE: 269-381-2222**

DATE: July 3, 2018

SECTION 00 0110 – TABLE OF CONTENTS

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DIVISION 32	EXTERIOR IMPROVEMENTS
32 1723	Pavement Marking

END OF SECTION 00 0110

SECTION 01 1000 – SUMMARY

PART 1 - GENERAL

1.1 Related Documents

- A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

1.2 Description of the Work

- A. The Work contemplated by the Contract Documents includes the Work of all trades required and all the labor, equipment, materials, and supervision necessary and incidental to the reconstruction of the WSU University Services Building.
- B. Work will be performed at locations within the structure as shown on the Drawings.
- C. Main items of the Work required in these areas are described in the Drawings and Specifications.
- D. It shall be understood that where additional Work is described, but not specifically located and/or shown on the Drawings, the Contractor shall be responsible for locating and marking areas to be repaired.

1.3 Work by Others

- A. The Owner may have other Work occurring within or adjacent to the Parking Structure at the same time as this Project. This Contractor shall cooperate at all times with the Owner to ensure that all Work proceeds without delay to scheduled completion.

1.4 Work Sequence

- A. Prior to commencement of Work, Contractor shall meet with Owner and Engineer to establish sequence and schedule of Work.
- B. Contractor shall notify Owner at least 24 hour prior to beginning any demolition or abrasive blasting operations.
- C. Contractor shall remove all broken concrete and debris from areas exposed to public view and dispose of same.
- D. Contractor shall remove dust and air transported abrasive from the remainder of the facility at the conclusion of abrasive blasting or demolition operations.

1.5 Project Meetings

- A. Refer to Section 01 3100 - Project Management and Coordination.

1.6 Contractor Log

- A. Contractor shall furnish and maintain one (1) log book at the Project site. Enter into this log each day:
 - 1. Weather conditions and temperature
 - 2. General progress of the Project
 - 3. Materials received
 - 4. Amount of materials placed
 - 5. Tests made
 - 6. Inspections made by other authorities
 - 7. All visitors to the Project site
 - 8. Unresolved problems
- B. Submit for record one copy of the log to the Engineer weekly. Refer to the following page for sample log sheet indicating minimum requirements.

1.7 Examination of Site

- A. The contractor shall visit the site of the Work, compare the Drawings and Specifications and other Contract Documents with existing conditions, including other's work, if any, being performed. Failure to visit the site shall in no way relieve the Contractor from the necessity of furnishing of materials or performing any work that may be required to complete the work in accordance with the Contract Documents.

1.8 Verification of Existing Dimensions

- A. Where the installation of new construction is dependent on existing dimensions, the Contractor requiring shall be responsible for the verification of existing dimensions prior to the construction or fabrication of materials.

PART 2 - PRODUCTS

2.1 Not used.

PART 3 - EXECUTION

3.1 Not used.

END OF SECTION 01 1000

CONTRACTOR'S LOG

Date:
Job Location:
General Contractor:

Weather Conditions
Time: _____ Temp: _____
Wind: 0-5 mph 5-10 mph 10-up
Humidity: Low - Med - High
Sky: Clear - Hazy - Overcast - Rain

No. of Workers on Site: _____

Sub-Contractors on Site: _____

Work Performed

Inspections, Tests Performed

Unresolved Problems

Materials Received

Change Orders Received

Visitors

Representing

CC To:

Signed: _____

SECTION 01 2100 – ALLOWANCES

PART 1 - GENERAL

1.1 Description

- A. The conditions of the Contract for the General Requirements of Division I are hereby made a part of this Section.
- B. This Section specifies procedures for allowances, which shall be included in the Contract Price Base Bid per the Contract Documents. Allowances have been established to defer to a later date the determination of the actual cost for work, which the exact quantity cannot be determined at the time of bidding, and to defer selection of actual materials and equipment.
- C. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated with related work.
- D. The following descriptions of the allowances describe the extent of the work in general. Detailed requirements may be specified in the various sections of the Specifications.
 - 1. Allowance No. 1: Include a lump sum of \$2,000 for capstone repair at the parapet wall.

PART 2 - PRODUCTS

2.1 Not Used.

PART 3 - EXECUTION

3.1 Not Used.

END OF SECTION 01 2100

SECTION 01 2300 – ALTERNATES

PART 1 - GENERAL

1.1 Related Documents

- A. The General Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

1.2 Summary

- A. This Section specifies administrative and procedural requirements for Alternates.
- B. An Alternate is an amount proposed by Bidders and stated on the Bid Form for certain construction activities defined in the Bidding Requirements that may be added to or deducted from Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in methods described in Contract Documents.
- C. The Owner reserves the right to reject all Alternates or accept any Alternates in order or combination and to determine the low bidder for each classification of Work on the basis of the sum of the base bid and the Alternates accepted.

1.3 Coordination

- A. Coordinate related Work and modify or adjust adjacent Work as necessary to ensure that Work affected by each accepted Alternate is complete and fully integrated into the project.

1.4 Notification

- A. Immediately following the award of the Contract, prepare and distribute to each party involved, notification of the status of each Alternate. Indicate whether Alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to Alternates.

1.5 Schedule

- A. A "Schedule of Alternates" is included at the end of this Section. Specifications Sections referenced in the Schedule contain requirements for materials and methods necessary to achieve the Work described under each Alternate.

- B. Include as part of each Alternative, miscellaneous devices, accessory objects and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

PART 2 - PRODUCTS

2.1 Not used.

PART 3 - EXECUTION

3.1 Schedule of Alternates

- A. Alternate 1: Roof Area A
 - 1. Remove and replace existing roofing as indicated on Drawings.
- B. Alternate 2: Roof Area B
 - 1. Remove and replace existing roofing as indicated on Drawings.
- C. Alternate 3: Roof Area C
 - 1. Remove and replace existing roofing as indicated on Drawings.
- D. Alternate 4: Roof Area D
 - 1. Remove and replace existing roofing as indicated on Drawings.
- E. Alternate 5: Roof Area E
 - 1. Remove and replace existing roofing as indicated on Drawings.
- F. Alternate 6: Roof Area F and Area F1, F2 & F3
 - 1. Remove and replace existing roofing as indicated on Drawings.
- G. Alternate 7: Galvanic Anodes
 - 1. Install galvanic anodes at concrete repairs as indicated on Drawings.
- H. Alternate 8: Accelerated Construction Schedule
 - 1. Provide alternate to accelerate construction schedule for Phase 2, 3 and 4 concrete repairs, while complying with local noise ordinances. Provide description of how you plan to accelerate schedule (double shift, weekend work, large crew, etc.). Provide alternate schedule showing proposed duration and completion date(s). Provide cost, if any, to complete work in accordance with the proposed accelerated construction schedule.

END OF SECTION 01 2300

SECTION 01 2900 – PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 Related Documents

- A. The General Conditions of the Contract for Construction and the General Requirements of Division I of these Specifications apply to the Work in this Section.

1.2 Project Pricing

- A. Bidder shall complete Bid Form, including all requested information.
- B. Project pricing is a combination of lump sum work items and unit price work items. Refer to below and the Bid Form.

1.3 Unit Prices

- A. Bidders shall submit unit prices for each unit price item listed in the Bid Form. The amount of each unit price shall be stipulated in the space provided in the Bid Form.

1.4 Lump Sum Prices

- A. Bidder shall submit lump sum prices for each lump sum item listed in the Bid Form. The amount of each lump sum price shall be stipulated in the space provided in the Bid Form.

1.5 Unit Price Quantity Measurement

- A. The Owner reserves the right to reject the Contractor's measurement of work-in-place that involves use of established unit prices, and to have this Work measured by an independent surveyor acceptable to the Contractor at the Owner's expense.
- B. Contractor shall maintain plan drawings locating all unit price repairs performed. Location and size of patches, overlays, etc. must be located on clean drawings. Separate drawings shall be maintained for each level and ceiling plan. Contractor shall submit copy of drawing identifying current quantities with each payment request. Work being invoiced must be properly identified. These drawings shall be incorporated into "Record Drawings" set required per Division 1.
- C. Quantity measurements shall be performed as described in Specification or shown on Drawings.

1.6 Schedule of Values

- A. The Contractor shall prepare a Schedule of Values for his Work as required by Article 9.2 of the General Conditions.
- B. Submit the Schedule of Values to the Engineer at the earliest feasible date, but in no case later than seven (7) days before the date scheduled for submittal of the initial Application for Payments.
- C. Update and resubmit the Schedule of Values when change orders result in a change in the Contract Sum.
- D. Use the project Bid Form as a guide to establish the format for the Schedule of Values.

1.7 Application for Payment

- A. The form of Application for Payment shall be notarized AIA Document G702, "Application and Certification for Payment," supported by AIA Document G703, Continuation Sheet.
- B. Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.
 - 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
 - 2. Include amount of change orders issued prior to the last day of construction period covered by the application.
- C. Submit three (3) executed copies of each Application for Payment to the Engineer. One copy shall be complete, including waivers of lien and similar attachments, when required.
- D. Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
 - 1. List of subcontractors
 - 2. List of principal suppliers and fabricators
 - 3. Schedule of Values
 - 4. Contractor's Construction Schedule (preliminary, if not final)
 - 5. Schedule of principal products
 - 6. Submittal Schedule (preliminary, if not final)
 - 7. List of Contractor's staff assignments
 - 8. List of Contractor's principal consultants
 - 9. Copies of permits
 - 10. Copies of authorizations and licenses from governing authorities for performance of the Work
 - 11. Initial progress report
 - 12. Certificates of insurance and insurance policies
 - 13. Performance and payment bonds (if required)
 - 14. Data needed to acquire Owner's insurance

- E. Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
 - 1. Completion of Project closeout requirements
 - 2. Completion of items specified for completion after Substantial Completion
 - 3. Assurance that unsettled claims will be settled
 - 4. Assurance that Work not complete and accepted will be completed without undue delay
 - 5. Transmittal of required Project construction records to Owner
 - 6. Proof that taxes, fees and similar obligations have been paid
 - 7. Removal of temporary facilities and services
 - 8. Removal of surplus materials, rubbish and similar elements
 - 9. Warranties

1.8 Waivers of Mechanics Lien

- A. With each Application for Payment submit waivers of mechanics liens from subcontractors or sub-subcontractors and suppliers for the construction period covered by the previous application.
- B. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
- C. When an application shows completion of an item, submit final or full waivers.
- D. The Owner reserves the right to designate which entities involved in the Work must submit waivers.
- E. Submit waivers of lien on forms, and executed in a manner acceptable to the Owner.

PART 2 - PRODUCTS

2.1 Not used.

PART 3 - EXECUTION

3.1 Not used.

END OF SECTION 01 2900

SECTION 01 3100 – PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 Related Documents

- A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

1.2 Meetings

- A. Pre-construction Meeting: Scheduled within 21 days after contract award or notice to proceed, whichever is earlier.
 - 1. Place and Time: A central site and time, convenient to all parties, as designated by the Engineer.
 - 2. Attendance: Contractor's project manager, Contractor's field superintendent, major subcontractors, Owner's representatives, and Engineer's representatives.
 - 3. Suggested Agenda
 - a. Project coordination
 - b. Use of site
 - c. Submittal and administrative procedures
 - d. Schedules for construction
 - e. Application for payment
 - f. Record documents
 - g. Construction facilities
 - h. Aids and controls
 - i. Security
 - j. Complex structure requirements
 - k. Insurance certificates
 - l. Bonds
 - m. Permits
 - n. Contractor's log
 - o. and other job-related subjects.
- B. Progress Meetings: Periodic meetings as agreed to by Owner, Engineer, and Contractor and supplementary progress meetings specially called by Owner, Engineer, or Contractor.
 - 1. Place: Project field office of Contractor.
 - 2. Times: Established at pre-construction conference and subsequent meetings as required for progress of the work, generally at twice once per month during construction period.
 - 3. Attendance: Same as for pre-construction conference, as appropriate for the circumstances.
 - 4. Suggested Agenda
 - a. Review, approval of minutes of previous meetings
 - b. Review of work progress since previous meeting
 - c. Field observations, problems, conflicts

- d. Problems that impede Construction Schedule
 - e. Review of off-site fabrication, delivery schedules
 - f. Corrective measures and procedures to regain projected schedule
 - g. Revisions to Construction Schedule
 - h. Coordination of schedules
 - i. Review of submittal schedules; expedite as required
 - j. Review proposed changes for:
 - 1) Effect on Construction Schedule and on completion date
 - 2) Effect on other contracts of the Project
 - k. And other business.
- C. Work phase specific meetings refer to individual sections of the Specifications.

1.3 Procedures

- A. The Engineer will act as chairman of the Pre-construction meetings; will prepare the minutes of each meeting, including names of participants, significant proceedings and decisions; and will distribute copies of minutes to the Contractor and the Owner. The Contractor shall be responsible for distributing copies to appropriate subcontractors and suppliers.
- B. Representatives of the Contractor, subcontractors, and suppliers attending the meeting shall be qualified, familiar with pertinent details of the work, and authorized to act on behalf of the entity each represents.
- C. When attendance is required by the Owner or Engineer, attendance shall be mandatory.

PART 2 - PRODUCTS

2.1 Not Used.

PART 3 - EXECUTION

3.1 Not Used.

END OF SECTION 01 3100

SECTION 01 3300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule, construction schedule, and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Submittals required for action and informational purposes are specified elsewhere.
- C. Submittals not requested from the Contractor will be returned stamped "No Architect/Engineer's Action Required."

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals." Informational submittals may also be referred to as submittals "for record."
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, testing, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 2. List and identify those submittals required early because of long lead time for manufacture or fabrication.
 3. Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule regularly to reflect changes in current status and timing for submittals.
 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Engineer's final release or approval.
 - g. Scheduled date of fabrication.
 - h. Scheduled dates for purchasing.
 - i. Scheduled dates for installation.
 - j. Activity or event number

1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Construction Schedule: Prepare and submit within 10 days after the execution of the Contract a construction schedule in bar chart form or using a time-scaled Critical Path Method (CPM) for the Work. Extend schedule from date established for the execution of the Contract to date of final completion.
1. Prepare a list of all activities required to complete the work. Identify critical path activities. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.
 2. Coordinate construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

3. Schedule shall include provisions for submittal review time, resubmittal review time, procurement time, material cure time, adverse weather, and constraints and work restrictions in the Contract Documents.
4. Schedules for restoration work shall indicate the areas to be closed during each phase of construction and shall indicate the proposed traffic flow for each phase.

1.6 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. All submittals shall be received in an orderly sequence and sufficiently in advance of construction requirements to allow time for checking, resubmitting and rechecking.
 5. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 1. Submittal Review: Allow 15 days for review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Resubmittal Review: Allow 15 days for review of each resubmittal.
 3. Sequential Review: Where sequential review of submittals by Engineer's consultants, Owner, or other parties is needed, allow 21 days for review of each submittal.
- C. Submittal Format:
 1. Contractor may elect to provide submittals by paper submittals or electronic submittals. Format selected shall be used for entire project duration.
 2. For projects where electronic submittals are provided, a corresponding paper submittal may also be required where indicated.
 3. For projects where paper submittals are provided, Engineer may not return paper copies of submittals and may return submittals electronically.
- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Engineer.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of subcontractor.
 - g. Name of supplier.
 - h. Name of manufacturer.
 - i. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a dash and then a sequential number (e.g., 033000-01). Resubmittals shall include an alphabetic suffix after another dash (e.g., 033000-01-A).
 - j. Number and title of appropriate Specification Section.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Other necessary identification.
4. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will return without review submittals received from sources other than Contractor.
 - a. Transmittal Form for Paper Submittals: Use transmittal form acceptable to Engineer and Owner, containing the following information:
 - 1) Project name.
 - 2) Date.
 - 3) Destination (To:).
 - 4) Source (From:).
 - 5) Name and address of Engineer.
 - 6) Name of Construction Manager.
 - 7) Name of Contractor.
 - 8) Name of firm or entity that prepared submittal.
 - 9) Names of subcontractor, manufacturer, and supplier.
 - 10) Category and type of submittal.
 - 11) Submittal purpose and description.
 - 12) Specification Section number and title.
 - 13) Specification paragraph number or drawing designation and generic name for each of multiple items.

- 14) Drawing number and detail references, as appropriate.
- 15) Indication of full or partial submittal.
- 16) Transmittal number.
- 17) Submittal and transmittal distribution record.
- 18) Remarks.
- 19) Signature of transmitter.

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

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a dash and then a sequential number (e.g., WSUUSB-033000-01). Resubmittals shall include an alphabetic suffix after another dash (e.g., WSUUSB-033000-01-A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Engineer.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Engineer and Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Engineer.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Names of subcontractor, manufacturer, and supplier.
 - g. Category and type of submittal.
 - h. Submittal purpose and description.
 - i. Specification Section number and title.
 - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Related physical samples submitted directly.
 - n. Indication of full or partial submittal.
 - o. Transmittal number.
 - p. Submittal and transmittal distribution record.
 - q. Other necessary identification.

- r. Remarks.
- 5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
 - a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- F. Options: Identify options requiring selection by Engineer.
- G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision. Clearly indicate all changes that have been made by clouding and use of revision number in a triangular symbol.
 - 3. Resubmit submittals until they are marked with approval notation from Engineer's action stamp.
- I. Distribution: Furnish final submittals to Engineer, Owner, manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, testing agencies, and others as necessary for performance of construction activities. Show distribution on transmittal forms. Format and quantities of final submittals shall be coordinated with each recipient.
- J. Review of resubmittals by the Engineer shall be limited to required corrections only, and the Contractor by resubmitting shall represent that the resubmittals contain no other alternations, additions or deletions. If additional changes have been made, same shall be specifically noted and described on the resubmittal.
- K. Use for Construction: Retain complete copies of submittals on Project site available for review. Use only final action submittals that are marked with approval notation from Engineer's action stamp. Contractor shall provide "Issued for Construction for Field Use" drawings as required for all field construction activities which shall be based on and referenced to final action submittals marked with approval notation from Engineer's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Submit electronic submittals via email as PDF electronic files.
 - a. If electronic file size of submittal exceeds email size limits of either Contractor or Engineer, Contractor shall post to Project Web Site and notify Engineer via email that submittal has been posted.
 - b. Engineer will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Action Submittals: If paper copies are submitted or required, Submit three paper copies of each submittal unless otherwise indicated. Engineer will return two copies.
 - 3. Informational Submittals: If paper copies are submitted or required, Submit two paper copies of each submittal unless otherwise indicated. Engineer will not return copies.
 - 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Modify standard drawings to delete information which is not applicable to project.
 - 4. Show dimensions and clearances.
 - 5. Supplement standard information to provide additional information applicable to project.
 - 6. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 - 7. Submit Product Data before or concurrent with Samples.

- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Highlight with notation, encircle, or otherwise indicate deviations from Contract Documents.
 - h. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches , but no larger than 30 by 42 inches.
- D. Samples: Submit Physical Samples for review and approval of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. The Engineer shall review and approve Contractor submittals such as schedules, products, materials, samples, and shop drawings for the limited purpose of conformance with the design concept and the information expressed in the Contract Documents.
 6. The Engineer shall not be responsible for any deviations from the Contract Documents not brought to the attention of the Engineer in writing by the Contractor.
 7. The Engineer shall not be required to review partial submittals or those for which submissions or correlated items have not been received. However, review of a specific item shall not indicate that the Engineer has reviewed the entire assembly of which the item is a component.
 8. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
- F. Contractor's Construction Schedule:
1. Contractor's Construction Schedule Updates: At bi-weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule before each regularly scheduled progress meeting. Issue schedule concurrently with each payment request.
 - a. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - b. Include a report with updated schedule that indicates every change, including, but not limited to, changes in critical path, activities, durations, and total float or slack time.
 - c. As the Work progresses, indicate final completion percentage for each activity.
 2. Recovery Schedule: When periodic updates indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
 3. Distribution: Distribute copies of schedule to Engineer, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

- a. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.
- G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 2900 "Payment Procedures."
- 1. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 4100 "Testing Laboratory."
 - 2. Promptly submit a written report of each test and inspection for record required of the Contractor, PDF file and one (1) copy each to the Engineer and Owner. Each report shall include:
 - a. Date issued
 - b. Project title and number
 - c. Testing laboratory name, address, and telephone number
 - d. Name and signature of laboratory inspector
 - e. Date and time of sampling or inspection
 - f. Record of temperature and weather conditions
 - g. Date of test
 - h. Identification of product and Specification Section
 - i. Location of sample or test in the Project
 - j. Type of inspection or test
 - k. Results of tests and compliance with Contract Documents
 - l. Interpretation of test results, when requested by the Engineer.
- H. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 7700 "Closeout Procedures."
- I. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Engineers and owners, and other information specified.
- J. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- K. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- L. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- M. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

- N. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- O. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- P. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- Q. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- R. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- S. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW AND RESPONSIBILITIES

- A. The submittals are not to be considered a part of the Contract Documents.
- B. Submittals shall demonstrate the Contractor understands and has interpreted the intent of the design as detailed and specified in the Contract Documents. The Contractor shall check and approve submittals for accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes, construction precautions and verification of field dimensions or conditions. The Contractor's responsibility for errors and omissions in submittals is not relieved by Engineer's review of submittals.
- C. All submittals to the Engineer shall be routed through the Contractor and bear the Contractor's Approval Stamp certifying they have been reviewed, checked, and approved for compliance with the Contract Documents. All submittals to the Engineer that are without this stamp of approval or that contain obvious errors or have not been checked or have been checked superficially will be returned unchecked and unstamped by the Engineer for resubmission by the Contractor.
 - 1. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of

reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

- D. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.
- E. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 7700 "Closeout Procedures."

3.2 ENGINEER'S ACTION

- A. The Engineer shall review and approve or take other appropriate action on the Contractor's submittals, such as shop drawings, product data, samples and other data, which the Contractor is required to submit, but only for the limited purpose of checking for conformance with the design concept and the information shown in the Construction Documents. This review shall not include review of the accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes, construction means or methods, coordination of the work with other trades or construction safety precautions, all of which are the sole responsibility of the Contractor. Review of a specific item shall not indicate that the Engineer has reviewed the entire assembly of which the item is a component. The Engineer shall not be responsible for any deviations from the Construction Documents not brought to the attention of the Engineer in writing by the Contractor. The Engineer shall not be required to review partial submissions or those for which submissions of correlated items have not been received.
- B. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
 - 1. The "actions taken" appearing on the Engineer's Approval Stamp shall be defined as follows:
 - a. "Approved" – Fabrication and/or installation may be undertaken. Approval does not authorize changes to the Contract Sum or Contract Time unless stated in separate letter or Change Order.
 - b. "Furnish as Corrected" – Fabrication and/or installation may be undertaken. Exceptions as noted are to be incorporated. Approval does not authorize changes to the Contract Sum or Contract Time unless stated in separate letter or Change Order.
 - c. "Revise and Resubmit" – Fabrication and/or installation MAY NOT be undertaken until exceptions as noted are incorporated and resubmitted for approval. Revision does not authorize changes to the Contract Sum or Contract Time.
 - d. "Rejected" – Fabrication and/or installation MAY NOT be undertaken. Submittal is too incomplete or does not meet Contract Documents. Resubmit for approval.
 - e. "No Architect/Engineer's Action Required" – Submittal not requested from the Contractor and was not reviewed.

- C. Informational (or For Record) Submittals: Engineer will review each submittal for conformance with submittal requirements only and not its content. Engineer will not return the submittal, or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Engineer.
- E. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- F. Submittals not required by the Contract Documents may be returned by the Engineer without action.

END OF SECTION 01 3300

WGI
CONTRACTOR SUBMITTAL REVIEW LABEL

Project: _____ Project No: _____
Contractor: _____ Subcontractor: _____
Supplier: _____ Manufacturer: _____
Date: _____ Revision Date: _____

Submitted Product: _____
Specification Section: _____ ASTM NO or Federal Spec: _____
Specified Material?: Yes / No
Product Use: _____ Ref Drwg # and Detail: _____
Date Submittal Received by WGI: _____
WGI Comments: _____

Contractor Comments: _____

Contractor's Approval Stamp

- | | |
|------------------------------------------------------------------|-----------------------------------------------|
| <input type="checkbox"/> Approved | <input type="checkbox"/> Furnish as Corrected |
| <input type="checkbox"/> Rejected | <input type="checkbox"/> Revise and Resubmit |
| <input type="checkbox"/> No Architect/Engineer's Action Required | |

This review is only for general conformance with the design concept of the project and the information given in the Construction Documents. Corrections or comments made on the shop drawings during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item shall not include approval of an assembly of which the item is a component. The contractor is responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of all other trades and performing all Work in a safe and satisfactory manner.

By: _____ Date: _____

CARL WALKER, A DIVISION OF WGI

SECTION 01 4100 – TESTING LABORATORY

PART 1 - GENERAL

1.1 Related Documents

- A. Conditions of Contract for Construction and General Requirements of Division 1 of these Specifications apply to Work of this Section.
- B. All testing of concrete will conform to requirements of ACI 301-05, Standard Specifications for Structural Concrete and ACI 311.5R-02, Guide for Concrete Plant Inspection and Field Testing of Ready-Mixed Concrete. Specific project requirements or modifications are specified herein.

1.2 Work Included

- A. Owner will employ and pay for services of an Independent Testing Laboratory approved by Engineer to perform testing as specified in this Section.
- B. Contractor shall pay cost for all re-tests and related engineering services which indicate that initial tested items are not in accordance with Contract Documents, and for additional tests that are for his convenience.

1.3 Related Work

- A. Following Work is related to this Section:
 - 1. Cast-In-Place Concrete Section 03 3000
 - 2. Shotcrete Section 03 3713
 - 3. Miscellaneous Metals Section 05 5700

1.4 Quality Control (ACI 301 1.6) Additional requirements are as follows:

- A. Laboratory will meet requirements of ASTM C 1077.
- B. Laboratory will have been inspected by an independent agency such as Cement and Concrete Reference Laboratory CCRL or AASHTO Material Reference Laboratory AMRL.
- C. Laboratory will meet "Recommended Requirements for Independent Laboratory Qualification," published by American Council of Independent Laboratories.
- D. Laboratory will be authorized to operate in state in which Project is located.
- E. An ACI certified Concrete Laboratory Testing Technician - Grade II will be responsible for concrete testing services.

- F. An ACI certified Concrete Field Testing Technician - Grade I will be responsible for field testing services.
- G. Employment of Laboratory will in no way relieve Contractor's obligations to perform Work of Contract.

1.5 Laboratory Responsibilities (ACI 301 1.6.4) Additional requirements are as follows:

- A. Laboratory will cooperate with Engineer, Contractor, and Subcontractors in order to provide qualified personnel upon due notice.
- B. All testing will be performed in a timely manner to prevent installation (or to allow for removal) of non-conforming material.
- C. All tests will be reported in writing to Contractor, Subcontractor, Supplier, Installer, etc., Engineer, and Owner. Written reports of test results will be delivered to above parties within 48 hours of testing or by FAX if immediately requested. Each report will include, as a minimum, following:
 - 1. Report number
 - 2. Date issued
 - 3. Project title and number
 - 4. Name of Contractor and Subcontractor if applicable
 - 5. Supplier
 - 6. Testing Laboratory name, address, and telephone number
 - 7. Name and signature of Laboratory Field Technician
 - 8. Date and time of sampling or inspection
 - 9. Record of temperature and weather conditions
 - 10. Date of test
 - 11. Identification of product and Specification Section
 - 12. Location of sample or test in Project
 - 13. Type of inspection or test
 - 14. Results of tests and compliance with Contract Documents
 - 15. Interpretation of test results when requested by Engineer

1.6 Submittals

- A. Upon request for review and approval certification and qualifications of Laboratory and Laboratory field Technicians.

1.7 Specific Tests, Inspections and Methods Required

- A. Excavating, Backfilling and Compaction
 - 1. Determine suitability of all materials to be used as fills, backfills, and leveling beds.

2. Perform one optimum moisture-maximum density curve in accordance with ASTM D1557 for each type of soil proposed for use.
 3. One field density test for each 2500 square feet or fraction thereof of each in-place fill layer in accordance with either ASTM D 1556, D 2167, or D 2922.
 4. Provide daily inspection and reports for compaction work.
 5. Confirm adequacy of bearing conditions for following:
 - a. Slab-on-Grade
- B. Cast-In-Place Concrete (ACI 301 1.6.4 and ACI 311.5R-1.3, 2.4): Comply also with testing requirements established in governing building codes. Additional requirements are specified as follows:
1. Concrete Compression ASTM C 39.
 - a. Laboratory will have a compression machine capable of breaking 6" X 12" cylinders of 10,000 psi or be prepared to test 4" X 8" cylinders in accordance with ASTM standards.
 - b. Take a minimum of six cylinders for each 50 cubic yards, or fraction thereof, of each mix design of concrete placed in any one day.
 - c. Compression test sample size will be 6" x 12" cylinders except that 4" x 8" cylinders may be used for silica fume concrete.
 - d. Compression tests
 - 1) Test 2 cylinders at 7 days.
 - 2) Test 2 cylinders at 28 days.
 - 3) Hold 2 cylinders in reserve for use as the Engineer directs.
 - e. After 56 days, unless notified by the Engineer to the contrary, reserve cylinders may be discarded without being tested for specimens meeting 28 day strength requirements.
 2. Slump Test
 - a. Conduct one slump test per batch at the point of placement ASTM C 143.
 - 1) When water reducing admixtures or high range water reducing admixtures are added at job site, test concrete slump prior to addition of admixtures.
 3. Air Content Testing
 - a. Sample and test each batch of air entrained concrete delivered to project ASTM C 173 or ASTM C 231 and ASTM C 138.
 4. Ambient Air Temperature and Composite Concrete Sample Temperature.
 - a. Record temperatures for each batch of concrete ASTM C 1064.
 5. Corrosion Inhibitor Testing
 - a. Concrete Producer shall have corrosion inhibitor Manufacturer/Supplier perform following:
 - 1) Install a visual reference (such as a bottle or other approved device) for dispensing Calcium Nitrite corrosion inhibitor. Visual reference shall be accessible to Independent Testing Laboratory, Manufacturer/Supplier's Representative, and Engineer.
 - 2) Calibrate dispensing system at initial equipment installation and annually thereafter. Install tamper proof seals after each calibration of system.
 - b. Concrete plant operator shall perform following:
 - 1) Verify contents of visual reference (such as a bottle or other approved device) prior to discharge of product for each batch. If visual reference does not indicate specified amount of corrosion inhibitor, concrete plant operator shall stop production and notify corrosion inhibitor Manufacturer/Supplier immediately.

- c. Independent Testing Laboratory shall perform following:
 - 1) Prior to and after each pour, take volume readings of corrosion inhibitor tank, correlate to size of pour, and report results to Engineer, corrosion inhibitor Manufacturer/Supplier, and concrete supplier. Volume used should be within +/- 10% of specified amount.
 - 2) Test plastic corrosion inhibitor concrete for presence of corrosion inhibitor in accordance with test method indicated in Appendix A. Test each concrete sample used for concrete compression test cylinders at rate of one test for each 50 cubic yards, or fraction thereof, of each mix design of concrete placed in any one day.
- 6. Submit for record field test reports including following information ACI 311.5R 2.5:
 - a. Project information as specified herein
 - b. Design mix number
 - c. Design strength
 - d. Cement content
 - e. Water content
 - f. Coarse aggregate lbs/yd
 - g. Fine aggregate lbs/yd
 - h. Admixtures
 - i. Truck number and/or ticket number
 - j. Drum rotation revolution
 - k. Cubic yards
 - l. W/C ratio
 - m. Batch time
 - n. Discharge start time
 - o. Empty time
 - p. Sample time
 - q. Slump
 - r. Air content
 - s. Air temperature and concrete temperature
 - t. Location of placement and location of sample batch
- 7. Submit for record laboratory test results including following information in addition to information cited under field tests.
 - a. Cylinder identification
 - b. Date tested, concrete age
 - c. Total load
 - d. Compressive strength
 - e. Type of fracture
 - f. Method of curing
 - g. Weight of cylinder

PART 2 - PRODUCTS

2.1 Not used.

PART 3 - EXECUTION

3.1 Not used.

Appendix A

Test method for Calcium Nitrite presence in plastic concrete.

Scope:

This method of test is used to determine presence of calcium nitrite in plastic concrete state. A freshly mixed concrete sample shall be tested. Quantofix test strips, for high range nitrite, manufactured by Gallard-Schlesinger Industries, Inc. of Carle Place, New York or equivalent, shall be used.

A. Apparatus

1. Quantofix Test Strips for high range nitrite #91322
 - a. CTL Scientific (888) 686-3454
2. 10cc disposable syringes with Leur-Lok tip #309604
 - a. Care Express (800) 339-3880
3. Disposable Filters 25mm/.45 micron #SLHAM3355
 - a. Millipore (800) 645-5476
4. Wide-mouth Container
5. Clean Measuring Cup

B. Procedure

1. Add field concrete to pre-measured 2 liters of water in a wide mouth container. Use water in the container to rinse out measuring cup.
2. Shake container 2-5 minutes until contents are well mixed. As indicated in Column 2 of following Table, stated quantity of concrete, in millimeters, should be obtained in container.
3. Using syringe, uptake approximately 10 ml of extraction water from container. Attach a disposable filter to end of syringe.
4. Filter the extraction water into a clean cup.
5. Dip test strip into clear, filtered extraction water and compare color to chart on side of test strip container.
6. Use following chart to determine amount of concrete to be extracted, and expected readings on test strips:

<u>Amount of Calcium Nitrate Added, liter/cu. Meters</u>	<u>Volume of Concrete to be Extracted, milliliters</u>	<u>Expected Reading on Test Strip</u>
9.9	225	0.3
12.4	180	0.3
14.8	150	0.3
17.3	130	0.3
19.8	225	0.6
22.3	200	0.6
24.8	180	0.6

Notes:

Column 1 indicates amount of calcium nitrite, in liters, that has been added to a cubic meter of concrete.
Column 2 indicates amount of concrete that should remain in container after shaking.
Column 3 is test strip reading that will correspond to indicated quantity of calcium nitrite.

END OF SECTION 01 4100

SECTION 01 5000 – CONSTRUCTION FACILITIES AND TEMPORARY SERVICES

PART 1 - GENERAL

1.1 Related Documents

- A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

1.2 Temporary Services General

- A. Maintain strict supervision of use of temporary services. Enforce conformance with applicable standards. Enforce safe practices. Prevent abuse of services and systems. Prevent damage to finishes.

1.3 Temporary Electric

- A. Electrical service is available at no charge to the Contractor from the electrical equipment room. Contractor may obtain temporary power for construction from this source, or may use own generator or the Contractor shall provide temporary electrical service.
- B. Temporary power service shall comply with OSHA Standards. The Contractor shall maintain these temporary services in good order throughout the project until Work is complete. All extension cords shall be provided by the Contractor or Subcontractor requiring the power.
- C. Electrical service shall not be used for heating.

1.4 Temporary Lighting

- A. The Contractor shall provide all supplemental temporary lighting for the Project.
 - 1. Provide adequate illumination for Work being performed.
 - 2. Provide adequate illumination for safe movement of authorized persons through Project.
 - 3. Provide adequate illumination for public safety and special warning lighting for hazardous conditions.
 - 4. Provide adequate illumination required to protect the Project site from unauthorized entry.

1.5 Temporary Telephone Service

- A. No telephones will be provided by Owner.
- B. Contractor to provide telephone service as required.

1.6 Temporary Water

- A. Sources of water are available at the site. The Owner will pay for reasonable amounts of water used for construction purposes.
- B. The Contractor shall provide, at the earliest possible date, temporary connections to the water supply sources and maintain adequate distribution for all construction requirements. The Contractor shall protect sources against contamination and damage.
- C. Methods of conveying this water shall be approved by the Engineer and shall not interfere with the Owner's operations.
 - 1. Prevent wasteful use of water. Protect system from freezing.

1.7 Temporary Heat

- A. Provide temporary heat required by construction activities, for storing temperature-sensitive materials, for installing materials, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Maintain air temperature at a minimum of 50°F inside parking structure. Select safe equipment that will not have a harmful effect on completed installations or elements being installed.

1.8 Temporary Sanitary Facilities

- A. Contractor shall use Owner's sanitary facilities. Location shall be designated by Owner.

1.9 Existing and Temporary Fire Protection

- A. Contractor shall provide adequate fire protection and fire prevention for the Project and in no case less than that required by applicable City, County, State, and Federal Laws.

1.10 Existing Utilities

- A. Do not disturb existing utilities servicing adjacent buildings without written permission from Owner.
 - 1. Request shall be in accordance with utility implementation and termination schedule. When an implementation and termination schedule are not required, request shall be made not less than 10 days prior to such request for interruption.
 - 2. Damage to utilities shall be repaired immediately, to the full satisfaction of the Owner.
 - 3. Unscheduled interruptions of utilities shall be corrected immediately, to the full satisfaction of the Owner.

1.11 Protection of Existing Trees and Vegetation

- A. Protect existing trees and other vegetation indicated to remain in place, against damage to roots, trunks or branches. Do not stockpile construction materials or excavated materials within drip line. Provide temporary guards to protect trees and vegetation to be left standing.
- B. Repair or replace trees and vegetation damaged by construction operations, in a manner acceptable to the Engineer. Use a qualified tree surgeon to repair tree damage.

1.12 Protection of Works

- A. The Contractor shall obtain the advice and recommendations of his installers for procedures to protect their work. Installers are responsible for protecting their work and that of other trades while working at the job site or in an area thereof. When the installer is no longer working in the area or at the job site, the Contractor shall provide protective measures and materials to assure that each element will be without damage or deterioration (other than normal weathering for exterior exposed materials) throughout the remainder of the construction period up to the date of substantial completion. Remove protective coverings and materials at the appropriate time, but no later than final cleaning operations.
- B. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings. Protect finished floors and stairs from traffic, movement of heavy objects, and storage.
- C. The general contractor shall maintain work area free of water; provide, operate, and maintain pumping equipment. Discharge water in accordance with requirements of public authorities.

1.13 Temporary Access

- A. The Contractor shall not barricade, lock, or otherwise block Plaza Level emergency exiting from the building during construction.
- B. Provide necessary signage at each building exit to notify Public "Exit closed due to construction – emergency exit only."
- C. Construction temporary ramps and stairs to meet all code safety requirements, including handrails, etc. Maintain until no longer required.

1.14 First Aid

- A. Contractor shall provide a first aid kit with adequate provisions for the materials being used on site. Contractor shall maintain an envelope to hang above the first aid kit which will contain all of the Health and Safety Data Sheets for materials being used on this Project.

1.15 Use of Parking Areas

- A. Parking is at the Contractor's own expense. Adequate public parking is available.

1.16 Barricades

- A. Refer to Section 01 5600.

1.17 Security

- A. The Contractor shall be responsible for the security of his work area and equipment.
- B. Adequate precautions shall be taken to prevent unauthorized personnel from entering the job site.

1.18 Dust and Fume Control

- A. Contractor shall take all necessary precautions to keep dust confined in the present work area.
- B. Contractor shall be responsible for any damage to vehicles due to the construction.
- C. Contractor shall submit to the Owner, for approval, proposed methods used to contain dust and fumes in work area.
- D. Prevent hazardous accumulations of dusts, fumes, mists, vapors or gases in areas occupied during construction. Provide local exhaust ventilation to prevent harmful dispersal of hazardous substances into atmosphere of occupied areas. Dispose in manner that will not result in harmful exposure to persons. Ventilate storage spaces containing hazardous or volatile materials.
- E. Water shall be used during concrete removal, saw cutting, etc. to contain dust.

1.19 Debris Control

- A. Contractor shall remove all debris from areas exposed to public view on a weekly basis or more often as required to maintain a neat, clean site and dispose of same at authorized dump sites.

1.20 Construction Loads

- A. Maximum construction loads of 30 pounds per square foot will be allowed on the parking ramp during construction.

1.21 Noise Control

- A. Contractor shall review with the Owner the types of equipment which he proposes to use during normal business hours and obtain Owner's approval for such use.
- B. Conform with local city noise ordinance.

1.22 Staging Area

- A. Contractor to coordinate with property contact for location of staging area.

1.23 Temporary Field Offices and Buildings

- A. Contractor to provide temporary gang boxes for storage, tools, etc. Location to be approved by the Owner.

1.24 Jobsite Documents

- A. The Contractor shall be provided with up to five sets of construction Drawings and Specifications. Additional sets will be provided upon request at cost.
- B. The Contractor shall keep in the field office at all times, in addition to above, the following items:
 - 1. The most recent revision of the Drawings and specifications, including all changes made by addenda, sketches, bulletins, and change orders.
 - 2. Safety Data Sheets
 - 3. The most recent issue of approved submittals. Obsolete or unapproved Submittals and Health and Safety Data Sheets shall not be kept at the jobsite.
 - 4. All material evaluation reports.

1.25 Video Tape Existing Conditions

- A. Prior to beginning work, Contractor shall produce a video record of existing conditions in work areas, with emphasis on the commercial space. Provide three copies of video to the Owner. Coordinate walk-through production with Owner and Engineer.

PART 2 - PRODUCTS

2.1 Not used.

PART 3 - EXECUTION

3.1 Not used.

END OF SECTION 01 5000

SECTION 01 5526 – TEMPORARY TRAFFIC CONTROL

PART 1 - GENERAL

1.1 Related Documents

- A. The Conditions of the Contract for Construction and the General Requirements of Division I of these specifications apply to the Work in this Section.

1.2 Traffic Control

- A. Within 15 days after execution of the Contract, determine the vehicle and pedestrian traffic flow and the signage for each phase of construction to maintain the traffic flow throughout the parking structure.
- B. Provide and maintain all drive lanes, entrances, exits, and safeguards required or necessary to the progress of the Work, and effectively control such traffic in a manner to provide minimum hazard to the Work and all persons.
- C. Route all construction equipment, trucks, and similar vehicles via existing public streets to and from the structure as approved by the governing authorities and the Owner.
- D. Maintain constant access for police, fire, and ambulance service.
- E. Provide and maintain for proper control of traffic and safety of all concerned, including all necessary barricades, suitable and sufficient lights, reflectors and danger signals, warning and closure signs and directional signs.
- F. Indicate by day and by night all restricted and dangerous conditions existing on or adjacent to the structure. Illuminate at night all barricades and danger signals, warning signs and obstructions. Keep all lights burning from sunset until sunrise.
- G. Vehicle and pedestrian traffic flow inside and outside of the structure shall be maintained to provide easy entry and exit from the structure and to all parking areas.

1.3 Signage

- A. Provide and maintain traffic signs through the duration of the Project to assist in traffic direction.
- B. Provide signs necessary to inform visitors and employees of closings and traffic flow modifications, both inside and outside of the structure. Sign wording, appearance and placement shall be approved by Owner.
- C. Work will not be permitted to proceed until required signage is in place.

1.4 Reference Standards

- A. Comply with the following reference standard; except where more stringent requirements are indicated on the Drawings or specified herein:
 - 1. Federal Highway Administration.
 - a. Part VI Standards and Guides for Traffic Controls for Street and Highway Construction, Maintenance, Utility and Incident Management Operations. Part VI of the Manual on Uniform Traffic Control Devices. (MUTCD).

PART 2 - PRODUCTS

- 2.1** Frames may be new or used, wood or metal, in sound condition and structurally adequate.
- 2.2** Signs shall be a minimum of half-inch exterior grade plywood.
- 2.3** Lettering shall be a minimum height of four inches and stenciled.
- 2.4** Paint shall be exterior quality and the color of the lettering shall be black on a highway orange background.

PART 3 - EXECUTION

- 3.1** Install at a height of optimum visibility, on frames or attached to structural surfaces.
- 3.2** Relocate support signs as required by progress of the Work.
- 3.3** Maintain signs and supports in a neat, clean condition; repair damages to support or sign.
- 3.4** Remove signs, framing and supports at completion of Project.

END OF SECTION 01 5526

SECTION 01 5600 – TEMPORARY BARRIERS AND ENCLOSURES

PART 1 - GENERAL

1.1 Related Documents

- A. The Conditions of the Contract for Construction and the General Requirements of Division I of these specifications apply to the Work in this Section.

1.2 Barricades

- A. Provide and maintain suitable barricades as required to prevent public entry, and to protect the Work, existing facilities, trees and plants from construction operations; remove when no longer needed, or at completion of Work. Barricades shall conform to city and state laws, ordinances, permit requirements.
- B. The Contractor shall provide and maintain all necessary barricades for safe conduct of his work, or as required by federal, state or local laws or ordinances and in accordance with OSHA requirements and other requirements of this Specification.
- C. Provide and maintain suitable barricades as required for protection of open excavations and post with warning lights.

1.3 Enclosures

- A. Enclosures shall be sufficient to prevent entrance/exit or infiltration of rain, water, wind or other elements, and which will prevent undue heat loss from within an enclosed area.
- B. Provide adequate ventilation and protection to provide construction personnel with safe working environment.
- C. Prevent hazardous accumulations of dusts, fumes, mists, vapors, or gases in areas occupied during construction. Provide local exhaust ventilation to prevent harmful dispersal of hazardous substances into atmosphere of occupied areas. Dispose in manner that will not result in harmful exposure to person. Ventilate storage spaces containing hazardous or volatile materials.
- D. Contractor shall submit to the Owner, for approval, proposed methods used to contain dust and fumes in work area.
- E. Contractor shall be responsible for any damage to vehicles due to the construction.

1.4 Construction/Maintenance

- A. Contractor shall be responsible for design, construction and maintenance of all barricades and enclosures.

PART 2 - PRODUCTS

- 2.1 Materials may be new or used, suitable for intended purpose.

PART 3 - EXECUTION

3.1 Installation

- A. Install barricades and enclosures of a neat and reasonable uniform appearance, structurally adequate for the required purposes.
- B. Maintain barricades and enclosures during entire construction period. Relocate barricades and enclosures as required with progress of construction.

3.2 Removal

- A. Completely remove barricades and enclosures when construction has progressed to the point that they are no longer needed.
- B. Clean and repair damage caused by installation of barricades and enclosures.

END OF SECTION 01 5600

SECTION 01 6000 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 Related Documents

- A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

1.2 Material and Equipment

- A. Comply with the applicable specifications and standards.
- B. Comply with size, make, type, and quality specified.
- C. Manufactured and fabricated products
 - 1. Design, fabricate, and assemble consistent with the current engineering and shop practices.
 - 2. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
 - 3. Two or more items of the same kind shall be identical, by the same manufacturer.
- D. Do not use material or equipment for any purpose other than that for which it is designed or specified.

1.3 Manufacturer's Instructions

- A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to the Engineer. Maintain one set of complete instructions at the job site during installation and until completion.
- B. Handle, install, connect, clean, condition, and adjust products in strict accord with such instructions and in compliance with specified requirements.
 - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with the Engineer for further instructions.
 - 2. Do not proceed with work without clear instructions.

1.4 Transportation and Handling

- A. Arrange deliveries of products in accordance with construction schedules, coordinate to avoid conflict with Work and conditions at the site.

1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals and that products are properly protected and undamaged.
- B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.5 Storage and Protection

- A. Store products in accord with manufacturer's instructions and as required by the technical specification, with seals and labels intact and legible.
1. Store products subject to damage by the elements in weather tight enclosures.
 2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
- B. Exterior storage
1. Store fabricated products above the ground on blocking skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
 2. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
- C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.
- D. Protection after installation
1. Provide substantial coverings as necessary to protect installed products from damage from weather, traffic and subsequent construction operations. Remove when no longer needed.

PART 2 - PRODUCTS

2.1 Not used.

PART 3 - EXECUTION

3.1 Not used.

END OF SECTION 01 6000

SECTION 01 7423 – FINAL CLEANING

PART 1 - GENERAL

1.1 Related Documents

- A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these specifications apply to the Work in this Section.

1.2 Work Included

- A. Facilities, equipment and labor for cleaning and waste disposal during construction and for final cleaning.

1.3 Responsibilities

- A. Contractor and each subcontractor and installer is responsible for specific cleaning operations of his work to the extent specified in the appropriate Specification Sections.
- B. Employ workmen or professional cleaners experienced in the specific cleaning operations.

1.4 Cleanup

- A. Conduct clean up and disposal operations to comply with applicable anti-pollution laws and local ordinances.
 - 1. Burning or burying of waste materials on the project site is not permitted.
 - 2. Disposal of volatile fluids and wastes in storm or sanitary sewers, or into streams or waterways, is not permitted.

PART 2 - PRODUCTS

2.1 Cleaning Materials

- A. Use cleaning materials for surfaces as recommended by Manufacturer.

PART 3 - EXECUTION

3.1 Cleanup

- A. At the time each work task is completed, clean the area involved to a condition suitable for occupancy and restore minor or superficial damage. Replace units and elements which are damaged beyond successful repair.
- B. Oversee cleaning and ensure that building, grounds, and public properties are maintained free from accumulation of waste materials and rubbish.
- C. Take measures to prevent spread of trash, debris, cartons, packaging or other waste materials on or off the project site by wind.
- D. Sprinkle dusty debris with water.
- E. At reasonable intervals during progress of work, clean-up site and access and dispose of waste materials, rubbish and debris.
- F. Clean adjacent and nearby streets of dirt occasioned by construction operations; frequency and methods as required by governing authority.
- G. Clean all surfaces of concrete paste.

3.2 Disposal

- A. Each Contractor or Subcontractor, in addition to the responsibilities set forth in the General Conditions, shall at all times keep the premises free from accumulation of waste materials or rubbish caused by the Work or his employees.
- B. Establish and enforce a daily system for collecting and disposing of waste materials from construction areas and elsewhere at the project site. Provide suitable trash containers at a central collection point on the site. Provide chutes or other suitable means for removing trash safely and cleanly from elevated portions of the work.
- C. Contractor and each Subcontractor and Installer is responsible for cleaning and removal of his trash and debris to the collection point.
- D. Do not hold collected materials at the site for periods of more than seven days. Handle hazardous, dangerous or unsanitary wastes separately from other waste materials, by containerizing properly. Dispose of each category of waste material in a lawful manner. Comply with federal, state, and local regulations for removal of combustible waste material and debris.
- E. Concrete debris shall be removed from the site and legally disposed of by concrete installer.

3.3 Project Closeout

- A. At the completion of the Project, the Contractor shall restore or replace all property damaged by his Work.
- B. Final cleaning shall include, as a minimum:

1. Remove grease, paint, dust, soil, stains, labels, fingerprints, writing, and other foreign materials from sight-exposed interior and exterior finished surfaces.
2. Clean all hardware.
3. Clean all plumbing fixtures.
4. Clean all lighting fixtures.
5. Repair, patch and touch up marred surfaces to specified finish to match adjacent surfaces.
6. Clean all maintenance, storage and mechanical rooms in parking structure.
7. Water blast floor surfaces at all Levels of Work performed.

END OF SECTION 01 7423

SECTION 01 7700 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 Related Documents

- A. The Conditions of the Contract for Construction and the General Requirements of Division I of these Specifications apply to the Work in this Section.

1.2 Cleaning and Closeout

- A. Refer to Section 01 7423 Final Cleaning for final cleaning of jobsite.
- B. A punch list consisting of copies of the plans showing locations of unacceptable items and an attached explanation of the nature of the unacceptable work shall be delivered to the Contractor after substantial completion of the Project.
- C. The Contractor shall submit "Record Drawings" after substantial completion of the project. The "Record Drawings" shall include, but not be limited to, the copies of the Drawings incorporating all changes and bulletins (enclosed in clouds), all shop drawings incorporating all changes (enclosed in clouds), and all approved submittals. Any dimensions beyond the tolerances of those established by nationally recognized standards for the specific CSI division or section applicable shall be included on the record drawings.
- D. Record Drawings shall also include location and size of all concrete patches and cracks.
- E. Closeout submittals include, but are not limited to, the following:
 - 1. Project record documents
 - 2. Maintenance manuals
 - 3. Extra stock
 - 4. Certificate of Inspection
 - 5. Warranties
- F. Evidence of payments and release of liens:
 - 1. Contractor's Affidavit of Payment of Debts and Claims: AIA G706.
 - 2. Contractor's Affidavit of Release of Liens: AIA G706A, with:
 - a. Consent of Surety to Final Payment: AIA G707
 - b. Contractor's release of waivers of lien for subcontractors, suppliers and others with lien rights against property of Owner, together with list of those parties.

1.3 Project Record Documents

- A. Maintain at Project site, one copy of:
 - 1. Contract Drawings (blueline prints)

2. Project Manual, including agenda
 3. Approved Shop Drawings
 4. Change Orders and Field Change Authorization
 5. Other modifications to Contract
 6. Field test records
- B. Store documents in temporary field office apart from documents used for construction. Provide files and racks for storage of documents.
- C. Maintain documents in clean, dry, legible conditions; do not use record documents for construction purposes.
- D. Make documents available at all times for inspection by Engineer and Owner.
- E. Contract Drawings: Legibly mark using a red pencil for all graphic work and red ink for all written work to record actual construction:
1. Depths of various elements of foundation in relation to first floor level.
 2. Field changes of dimension and detail.
 3. Changes not made by change order and field change authorization.
 4. Details not on original Contract Drawings.
- F. Specifications and Addenda: markup each Section to record:
1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
 2. Change made by change order, field change authorization and notice of clarification.
 3. Other matters not originally specified.
- G. Shop Drawings: Maintain as record documents; legibly annotate Shop Drawings to record changes made after approval.
- H. At completion of Project, deliver Record Documents to Engineer.

1.4 Warranties and Bonds

- A. The act of the Contractor in executing the Agreement for this Work shall be considered as his acceptance of the following guarantee covering the Project:
1. Any materials, workmanship or equipment furnished as a part of this Project which prove defective or fail to operate properly, within one (1) year, or as otherwise specified in the Contract Documents, of the date of acceptance of the Work required under this (or substantial completion of the) Project (damage by wear and tear, violence or casualty not the fault of the Contractor excepted), shall be repaired and replaced by the Contractor promptly upon notification from the Owner and without cost to the Owner.
 2. This guarantee provision shall apply regardless of whether or not such defective workmanship, materials or equipment are listed in the final punch list. Date of acceptance (or substantial completion) will be established by the Owner and Engineer upon finding all items of this Project substantially complete as to quality of workmanship and materials. Also see Division 7 for additional guarantees.

3. Contractor shall provide warranty commencing on the date of Project acceptance. Completion of various Project phases shall not initiate commencement of warranty in these specific areas. A single Project warranty date, at Project acceptance, will constitute commencement of warranty.

NOTE: Some areas of Project may be open to vehicular traffic and subject to wear (i.e. coatings, sealants) prior to commencement of warranty.

PART 2 - PRODUCTS

2.1 Not used.

PART 3 - EXECUTION

3.1 Not used.

END OF SECTION 01 7700

SECTION 02 4119 – SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 Related Documents

- A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

1.2 Work Included

- A. The Work of this Section shall include furnishing all labor, materials, equipment, and supervision to demolish, haul, and dispose of concrete, masonry and roofing materials in accordance with the Drawings and as specified herein.
 - 1. Concrete delaminations to the depth as indicated on the Drawings.
 - 2. Deteriorated or damaged masonry as indicated on the Drawings.
 - 3. Masonry openings for overflow scuppers and roof demolition.

1.3 Related Work

- A. The following Work is related to this Section:

1. Concrete Repair	Section 03 0130
2. Concrete Reinforcement	Section 03 2000
3. Cast-in-Place Concrete	Section 03 3000
4. Shotcrete	Section 03 3713
5. Masonry Restoration & Cleaning	Section 04 0100
6. Preparation for Re-Roofing	Section 07 0150.19
7. Spray-Applied Fire Resistive Materials (SFRMs)	Section 07 8100

1.4 Quality Control

- A. After demolition is complete but prior to final cleaning, the cavities and all exposed reinforcement shall be reviewed by the Engineer. The review shall include sounding the exposed concrete to determine completeness of delamination removals, examination of dressed edges to verify depth and vertical edge of cut, and uniformity of excavation to insure compliance with minimum limits specified.
- B. The Engineer shall review all reinforcement exposed within the cavities for corrosion or damage resulting from Contractor's removal operations. Replacement of defective or damaged reinforcement bars shall be performed in accordance with Section 03 2000, Concrete Reinforcement.

1.5 Safety

- A. Locate electrical conduits prior to concrete demolition or sawcutting. Contractor shall take all necessary precautions to prevent damage to the conduit. Contractor is solely responsible for training and monitoring his work force concerning the safety procedures that should be employed in the execution of this work. Contractor shall repair, at no cost to the Owner, all damage caused by his work.
- B. The concrete slab may have embedded electrical conduit. Contractor shall take all necessary precautions to prevent damage to the conduit. Contractor shall coordinate with Owner to shut off power if repairs are located near conduit.

1.6 Submittals

- A. Submit for review and approval prior to beginning Work a copy of the proposed restoration sequencing plan.
- B. Submit for record types of equipment proposed for use.

1.7 Basis of payment

- A. Demolition cost to be included in repair costs, unless otherwise noted.

PART 2 - PRODUCTS

2.1 Not Used

PART 3 - EXECUTION

3.1 Inspection

- A. Examine areas and conditions under which the Work is to occur. Notify the Engineer immediately in writing as required in the General Conditions of any conditions detrimental to the proper and timely completion of this Work.

3.2 General

- A. Review with the Owner and Engineer the types of equipment proposed for use.
- B. Conduct demolition operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.

- C. Protect Owner's property which is to remain including; facades, signs, windows, doors, plantings, parking equipment, electrical and mechanical lines and fixtures.
- D. Protect adjoining properties, public thoroughfares, sidewalks and utilities from damage due to this operation.
- E. Take adequate precautions and provide protection as required to prevent damage to remaining existing elements of the parking structure and all adjoining building elements, and all vehicles using the facility.
- F. At no cost to the Owner, promptly repair damage to adjacent facilities resulting from demolition operations.
- G. Clean adjacent facilities of dust, dirt and debris resulting from demolition operations.
- H. Authority for performing necessary work on public and private property adjoining Owner's property shall be obtained by the Contractor.
- I. Remove all temporary protection and devices when no longer needed and when directed by the Owner.

3.3 Delaminated Concrete Surface Preparation

- A. Location and Marking of Work Areas
 - 1. Locate floor slab delaminations by sounding the surface with a hammer or rod, or dragging a chain. The Contractor shall sound all floor slabs. Delaminated areas once located by the Contractor will be further sounded to define their limits. These limits or "boundaries" shall be marked with chalk or paint.
 - 2. Beam, wall, column, ceiling and slab delaminations shall be located by sounding the appropriate member with a hammer or rod. Cracks, usually horizontal in orientation along beam faces and vertical in orientation near corners of columns, are reliable indicators of delaminated concrete. Delaminated areas once located by the Contractor will be further sounded to define their limits. These limits or "boundaries" shall be marked with chalk or paint.
 - 3. Prior to concrete removal locate reinforcing bars and electrical conduits in the vicinity of the repairs. Take the necessary precautions to prevent damage to reinforcement and electrical conduits.
- B. Concrete Removal and Surface Preparation
 - 1. All concrete shall be removed from within the marked boundary to a minimum depth as indicated on the Drawings using 15 to 30 pound chipping hammers equipped with chisel point bits. Larger chipping hammers with a maximum stroke of 4 inches shall not be used without approval from the Engineer. If delaminations exist beyond the minimum removal depth, then chipping shall continue until all unsound and delaminated concrete has been removed from the cavity.
 - 2. Where reinforcing bars are exposed by concrete removal, extra caution shall be exercised to avoid damaging them during removal of additional unsound concrete. The

minimum depth of concrete removal around and beyond the perimeter of the bar for the entire exposed length shall be as indicated on the Drawings.

3. If rust is present on reinforcing bars where they enter sound concrete, then additional removal of concrete along the reinforcement is required. Such additional removal shall continue until grey reinforcement is exposed. If rust persists beyond the removal limits, the Engineer shall be advised and will direct further removals.
 4. Delaminated, spalled and unsound concrete shall have their marked boundaries sawcut to a depth as indicated on the Drawings. All edges shall be straight and patch areas polygon shaped. A diamond blade saw or grinder with abrasive disk suitable for cutting concrete is acceptable for performing this work. The edge cut at the delamination boundary shall be dressed perpendicular to the member face. It shall also be of uniform depth for the entire length of the cut.
- C. Preparation of Concrete Bonding Surface
1. Abrasive blast or high pressure waterblast all exposed concrete surfaces to remove laitance and any foreign material that may impair bonding prior to concrete placement.
- D. Cleaning and Securing of Reinforcing
1. Refer to Section 03 2000, Concrete Reinforcement. Existing reinforcing and miscellaneous metals shall be cleaned of rust and laitance to near white metal.
- E. Final Preparation
1. Airblasting is required as a final step to remove dust and debris.

3.4 Stain Removal

- A. Existing beams, columns, walls, and ceilings which have been stained by previous leaking or leaching should be cleaned through abrasive blasting, water blasting, grinding, or other mechanical means. All evidence of previous leaking and leaching is to be removed.

3.5 Disposal

- A. Remove and properly dispose of concrete and debris from areas exposed to public view on a daily basis.

END OF SECTION 02 4119

SECTION 03 0130 – CONCRETE REPAIR

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 Work Included

- A. The Work of this Section shall include providing and installing concrete patching materials, as indicated on the Drawings and as herein specified.

1.3 Related Work

- A. Related work specified elsewhere:
 - 1. Section 02 4119 Selective Demolition
 - 2. Section 03 1100 Concrete Formwork
 - 3. Section 03 1500 Concrete Accessories
 - 4. Section 03 2000 Concrete Reinforcement
 - 5. Section 03 3000 Cast-In-Place Concrete
 - 6. Section 03 3713 Shotcrete
 - 7. Section 07 1800 Traffic Coatings
 - 8. Section 07 9200 Joint Sealants

1.4 Reference Standards

- A. Comply with the following reference Standards; except where more stringent requirements are indicated on the Drawings or specified herein:
 - 1. American Concrete Institute (ACI)
 - a. ACI 117 Standard Tolerances for Concrete Construction and Materials.
 - b. ACI 201.2R Guide to Durable Concrete.
 - c. ACI 222R Corrosion of Metals in Concrete.
 - d. ACI-301 Specifications for Structural Concrete for Buildings.
 - e. ACI-302.1R Guide for Concrete Floor and Slab Construction.
 - f. ACI 304R Guide for Measuring, Mixing, Transporting and Placing Concrete.
 - g. ACI 305R Hot Weather Concreting.
 - h. ACI 306R Cold Weather Concreting.
 - i. ACI 306.1 Standard Specification for Cold Weather Concreting.

- j. ACI 318 Building Code Requirements for Structural Concrete and Commentary.
 - k. ACI 347R Guide to Formwork for Concrete.
2. International Concrete Repair Institute (ICRI)
- a. ICRI Concrete Repair terminology
 - b. ICRI Technical Guideline No. 320.2R *"Guide for Selecting and Specifying Materials for Repair of Concrete Surfaces"*.
 - c. ICRI Technical Guideline No. 320.1R *"Guide for Surface Preparation for the Repair of Deteriorated Concrete from Reinforcing Steel Corrosion"*.

1.5 Quality Control

- A. The patched areas shall be sounded with a hammer 7 days after placement. Repair all detected hollowness by removing and replacing the patch or affected area at no extra cost to the Owner.
- B. If shrinkage cracks appear in the repair material within 72 hours after placement, the repairs shall be considered defective, and shall be removed and replaced at no extra cost to the Owner.
- C. Plan drawings shall be maintained locating all repairs performed under this Section. Location and size of patches, overlays, etc. must be located on clean drawings. Separate drawings shall be maintained for each Level and Ceiling plan. These drawings shall be incorporated into record set required per Division 1.
- D. The Contractor, or Restoration Subcontractors, shall have not less than two (2) years experience in the field of structural concrete restoration work.

1.6 Environmental Requirements

- A. Cold weather concreting: In accordance with ACI 306.1 or as specified herein.
- B. Hot weather concreting: In accordance with ACI 305 or as specified herein.
- C. Inclement Weather:
 - 1. Unless adequate protection is provided, concrete shall not be placed during rain, sleet or snow.
 - 2. Rain water shall not be allowed to increase the mixing water nor to damage the surface finish.

1.7 Submittals

- A. Submit for record the Manufacturer's Spec Data Sheets and Safety Data Sheets.
- B. Submit for record upon request, a written description of the Contractor's concrete repair ability, including equipment, facilities, personnel, and a list of similar completed projects.

1.8 Transportation and Handling

- A. Store materials on platforms off ground, protected from the elements.
- B. Handle and store aggregates in a manner to prevent intrusion of foreign material. Protect all material until used.
- C. Material which has deteriorated or which has been damaged shall not be used.

1.9 Basis of Payment

- A. All patching quantities shall be measured on a unit cost basis. Refer to Bid Form.
- B. Depth of patches are as indicated on the Drawings.
- C. Submit copy of drawings identifying current quantities with each payment request. Work being invoiced must be properly identified. These drawings shall be incorporated into record set required per Division 1.

PART 2 - PRODUCTS

2.1 Horizontal Repair Mortar (Corrosion Inhibitor)

- A. Repair mortar to be traffic bearing, polymer modified with corrosion inhibitor, cementitious, type and thickness to meet conditions as indicated on the Drawings.
- B. For deeper patches add aggregate per Manufacturer's recommendation.
- C. Acceptable repair mortar with corrosion inhibitor for patching horizontal surfaces is:
 - 1. Sikatop 111 Plus or Sikacrete 211 SCC Plus, Sika Corp., Lyndhurst, NJ.
 - 2. MasterEmaco S 466CI or S 477CI, BASF, Shakopee, MN.
 - 3. Eucocrete Supreme, Euclid Chemical Co., Cleveland, OH
 - 4. Planitop 15 or FD, Mapei, Deerfield Beach, FL
 - 5. Meadow-Crete GPS, W.R. Meadows, Inc., Hampshire, IL
 - 6. Or Approved Equivalent

2.2 Vertical and Overhead Repair Mortar (Corrosion Inhibitor)

- A. Repair mortar to be polymer modified cementitious, with corrosion inhibitor, type and thickness to meet conditions as indicated on the Drawings.
- B. Trowel Applied - Acceptable repair mortar with corrosion inhibitor for patching vertical surfaces is:

1. MasterEmaco S 488CI, BASF, Shakopee, MN.
 2. Sikatop 122 Plus or 123 Plus, Sika Corp., Lyndhurst, NJ.
 3. Verticoat Supreme, Euclid Chemical Co., Cleveland, OH
 4. Planitop 23, or X, Mapei, Deerfield Beach, FL
 5. Meadow-Crete GPS, W.R. Meadows, Inc., Hampshire, IL
 6. Or Approved Equivalent
- C. Form and Pour - Acceptable repair mortar with corrosion inhibitor for patching vertical surfaces is:
1. MasterEmaco S 466CI or S 477CI, BASF, Shakopee, MN.
 2. Sikatop 111 Plus or Sikacrete 211 SCC Plus, Sika Corp., Lyndhurst, NJ
 3. Eucocrete Supreme, Euclid Chemical Co., Cleveland, OH
 4. Planitop 15 or FD, Mapei, Deerfield Beach, FL
 5. Or Approved Equivalent

PART 3 - EXECUTION

3.1 Inspection

- A. Before commencing work, examine all adjoining work on which this work is dependent and report in writing to the Engineer any condition which prevents Contractor from performing the work. Starting work constitutes acceptance of adjoining work.

3.2 Surface Preparation

- A. Refer to Section 02 4119, Selective Demolition

3.3 Existing Reinforcement

- A. Refer to Section 03 2000, Concrete Reinforcement

3.4 Placing Concrete Patching Materials

- A. The mixing and installing of the concrete patching materials and the priming of the existing concrete surface shall be in accordance with the Manufacturer's recommendations.
- B. Concrete patching materials shall be cured according to the Manufacturer's recommendations.

END OF SECTION 03 0130

SECTION 03 1100 - CONCRETE FORMWORK

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.
- B. The latest editions of ACI 301, "Standard Specification for Structural Concrete" and ACI 117 Standard Specifications for Tolerances for Concrete Construction and Materials are hereby a part of this Section. Specific project requirements or modifications are specified herein.

1.2 Work Included

- A. Work of this Section shall include design, material, delivery, labor, equipment, and supervision to install formwork and shoring systems for cast-in-place concrete as indicated on Drawings and as specified herein.

1.3 Related Work

- A. Related Work specified elsewhere:
 - 1. Section 03 0130 Concrete Repair
 - 2. Section 03 1500 Concrete Accessories
 - 3. Section 03 2000 Concrete Reinforcement
 - 4. Section 03 3000 Cast-In-Place Concrete
 - 5. Section 03 3713 Shotcrete

1.4 Reference Standards

- A. Comply with following reference standards, except where more stringent requirements are indicated on Drawings or specified herein:
 - 1. American Concrete Institute (ACI):
 - a. ACI 347R, Guide to Formwork for Concrete, latest edition.
 - b. ACI SP-4, Formwork for Concrete, latest edition.
 - c. As indicated in Section 03 3000 "Cast-In-Place Concrete"
 - 2. American Welding Society (AWS):
 - a. AWS D1.1 Structural Welding Code - Steel, latest edition.
 - 3. American Iron and Steel Institute (AISI):

- a. AISI Cold-Formed Steel Design Manual, latest edition.
- 4. Occupational Health and Safety Administration (OSHA):
 - a. Safety Standards, latest revisions.

1.5 Performance and Design Requirements (ACI 301, 2.2.2) Additional requirements:

- A. Formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces, structure, or adjacent materials.
- B. Shoring shall be secured against horizontal movement by bracing in both longitudinal and transverse directions. Shoring shall be braced at intermediate levels when more than twelve (12) feet high.
- C. Provide shoring so loads from construction above will transfer directly. Space shoring in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members where no reinforcing steel is provided.

1.6 Quality Control

- A. Formwork materials and installation work may be reviewed by the Engineer at any time during the progress of the Work. Allow free access to facilities for this purpose.

1.7 Submittals (ACI 301 2.1.2)

- A. For record formwork product data including facing materials.
- B. For record formwork release agent product data.

1.8 Transportation and Handling

- A. Store all formwork materials clear of ground, protected, so as to preclude damage.

1.9 Basis of Payment

- A. Formwork and shoring are to be included in cost of concrete placement and demolition.

PART 2 - PRODUCTS

2.1 Materials (ACI 301 2.2.1) Additional requirements as follows:

- A. Form-facing materials (ACI 301 2.2.1.1)

1. Formwork for exposed finish concrete to provide smooth form finish.
 - a. Unless otherwise indicated, construct with plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system indicated on Drawings. Provide formwork material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.
2. Formwork for unexposed finish concrete to provide rough form finish.
 - a. Construct with plywood, lumber, metal, and other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 Formwork Accessories (ACI 301 2.2.1.2) Additional requirements as follows:

- A. Ties exposed to view or exposed to weather:
 1. Ties shall be one of following:
 - a. stainless steel AISI 302/304 or
 - b. "snap off" type or
 - c. removable.
 2. "Snap off" metal ties shall have cones and be designed to break back to allow a minimum 1-1/2 inch cover over ends or portions of ties remaining.
 3. "Snap off" area shall not leave a hole larger than one inch diameter in concrete surface.
- B. Ties used in areas which will not be exposed to view or are below grade shall be commercially manufactured with no minimum requirements regarding stainless steel/"snap-off"/removeability.

2.3 Form Release Agent (ACI 301 2.2.1.3) Additional requirements as follows:

- A. Form release agent shall be non-toxic, VOC compliant, environmentally safe compatible with formwork material and shall not dust, contribute to bug holes nor adversely affect concrete surfaces, and shall not impair subsequent treatment of concrete surface.

2.4 Shores

- A. Shores shall consist of wood or steel posts.

PART 3 - EXECUTION

3.1 Inspection

- A. Inspect area to receive Work and report immediately in writing to Engineer, as required in General Conditions, any unacceptable conditions.

3.2 Formwork Fabrication and Manufacture (ACI 301 2.2.3) Additional requirements as follows:

- A. Kerf wood inserts for forming keyways, reglets, recesses, etc., to prevent swelling and assure ease of removal.
- B. Bevel reentrant corners or edges of formed joints as indicated on Drawings.

3.3 Construction and Erection of Formwork (ACI 301 2.3.1) Additional requirements as follows:

- A. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.
- B. Form joints in all exposed concrete surfaces shall be securely taped or sealed by approved means to prevent leakage and loss of paste during placement of concrete.
- C. All wood forms for columns shall be securely tied together with adjustable steel clamps, spaced so as to insure an absolute rigid form in conformance with printed tables of the clamp Manufacturer.
- D. Re-tighten forms immediately after concrete placement as required to eliminate mortar leaks.
- E. Do not thin form release agent.
- F. If steel forms are used, form release agent shall be non-staining rust preventative.

3.4 Tolerances (ACI 301 2.3.1.2) Additional requirements as follows:

- A. Construct formwork to provide completed concrete surfaces complying with tolerances specified in ACI 117, Sections 3 and 4.
- B. Check lines and levels of completed formwork for all exposed columns, spandrels, etc. before concrete is placed.
- C. Make corrections or adjustments to formwork that will be required to correct any deviation which exceeds specified tolerances.
- D. Check formwork during concrete placement to ensure that forms, shores, falsework, ties, and other features have not been disturbed by concrete placement methods or equipment.

- E. The offset between adjacent formwork facing material shall not exceed ACI 117 Class A 1/8 inch.

3.5 Installation of Reinforcement

- A. Refer to Section 03 2000, Concrete Reinforcement.

3.6 Removal of Formwork (ACI 301 2.3.2) Additional requirements as follows:

- A. Formwork removal shall be coordinated with curing requirements as specified in Section 03 3000 Cast-In-Place Concrete.
- B. Formwork including shores for structural members ie. piers, columns, walls, beams, and slabs shall remain in place until minimum formwork removal strength is obtained as specified on Drawings.
- C. Formwork removal strength will be verified by field-cured test cylinders in accordance with ACI 301 2.3.4.1 or 2.3.4.2.
- D. In no case shall formwork and shoring removal from horizontal members be before concrete strength is at least 70 percent of specified design strength or approved by Engineer.
- E. Horizontal supported floor construction (slabs, beams, girders, stair slabs) shall be reshored immediately following formwork removal.

3.7 Re-Use of Forms

- A. Clean and repair surfaces of forms to be re-used. Remove fins and laitance, and tighten forms to close joints. Align and secure joints to avoid offsets. Split, frayed, delaminated or otherwise damaged form facing material shall not be acceptable for exposed surfaces.
- B. Apply new form-release agent as specified.
- C. Do not use "patched" forms for exposed concrete surfaces, unless approved by Engineer.

END OF SECTION 03 1100

SECTION 03 1500 - CONCRETE ACCESSORIES

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 Work Included

- A. Work of this Section shall include all materials, equipment, labor, and supervision to furnish and install all concrete accessories as herein specified and as indicated on Drawings, including all anchor bolts, inserts, plates, slide bearing systems, angles, sleeves, nailing blocks, joint fillers, masonry hardware, or embedded items furnished by Others.

1.3 Related Work

- A. Related work specified elsewhere:
 - 1. Section 03 0130 Concrete Repair
 - 2. Section 03 1100 Concrete Formwork
 - 3. Section 03 2000 Concrete Reinforcement
 - 4. Section 03 3000 Cast-In-Place Concrete
 - 5. Section 03 3713 Shotcrete
- B. Reference Standards
 - 1. Comply with following reference standards, except where more stringent requirements are indicated on Drawings or specified herein:
 - a. American Concrete Institute (ACI)
 - 1) Editions as indicated in Section 03 3000, Cast-In-Place Concrete.
 - b. American Society for Testing and Materials (ASTM)
 - 1) As specified herein

1.4 Transportation and Handling

- A. Deliver concrete accessories to site bundled or packaged, tagged and marked indicating product, size, Manufacturer and other identifying information.
- B. Store materials at site in such a way to maintain them dry, undamaged and clean.

1.5 Submittals

- A. For review and approval concrete accessory Manufacturer's product literature.

1.6 Samples

- A. Submit for review and approval upon request samples of concrete accessories.

1.7 Basis of Payment

- A. Concrete accessories are incidental to cost of concrete and repair items.

PART 2 - PRODUCTS

2.1 Adhesive Anchors

- A. Provide sizes and types as indicated on Drawings.
- B. All threaded rods and associated hardware to be Type 303/304 stainless steel.
- C. Injection gel to be two-component epoxy ASTM C 881.
- D. Stainless steel screens as indicated on Drawings or as recommended by Manufacturer.
- E. Installation per Manufacturer's recommendations.
- F. Acceptable materials are:
 - 1. C6+, ITW Ramset/Redhead
 - 2. G5, ITW Ramset/Redhead
 - 3. HY-System Anchors, Hilti, Inc.
 - 4. HY 200 (solid concrete), Hilti, Inc.
 - 5. AC100+ Gold, Powers Fasteners Inc.
 - 6. or Approved Equivalent.

2.2 Compressible Joint Filler

- A. Compressible joint filler for isolation of slabs, walls, columns as indicated on Drawings.
- B. Acceptable materials are:
 - 1. Ceramar Flexible Foam Expansion Joint, W. R. Meadows
 - 2. Flex/Foam Expansion Joint, Right/Pointe Company
 - 3. or Approved Equivalent.

2.3 Galvanic Anodes (Alternate)

- A. Installation per Manufacturer's recommendations.
- B. Acceptable materials are:
 - 1. Galvashield XP2, Vector Corrosion Technologies
 - 2. Sentinel Silver Anodes, Euclid Chemical Co.
 - 3. or Approved Equivalent.

PART 3 - EXECUTION

3.1 Inspection

- A. Inspect area to receive Work and report immediately in writing to Engineer, as required in General Conditions, any unacceptable conditions.

3.2 Installation

- A. Contractor shall be responsible for proper placing of all embedded pipe, conduit, and other fixtures.
- B. Minimum cover requirements for reinforcing shall apply to all embedded items unless indicated otherwise on Drawings.
- C. Use suitable templates to accurately set and support bolts, inserts, sleeves, or other embedded items against displacement.
- D. Compressible joint filler shall be applied to surfaces as detailed and indicated on Drawings. Adhesive shall be applied in strict accordance with Manufacturer's recommendations. Adequate curing time shall be allowed for adhesive prior to placing concrete against filler surface.

END OF SECTION 03 1500

SECTION 03 2000 - CONCRETE REINFORCEMENT

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.
- B. ACI 301 Standard Specifications for Structural Concrete and ACI 117 Standard Specifications for Tolerances for Concrete Construction and Materials are hereby a part of this Section. Specific project requirements or modifications are specified herein.

1.2 Work Included

- A. Work of this Section shall include materials, fabrication, delivery, and installation of reinforcement for cast-in-place concrete.
- B. Field epoxy coating of exposed reinforcement in concrete cavities.

1.3 Related Work

- A. Related work specified elsewhere:
 - 1. Section 03 0130 Concrete Repair
 - 2. Section 03 1100 Concrete Formwork
 - 3. Section 03 1500 Concrete Accessories
 - 4. Section 03 3000 Cast-in-Place Concrete
 - 5. Section 03 3713 Shotcrete

1.4 Reference Standards

- A. Comply with following reference standards, except where more stringent requirements are indicated on Drawings or specified herein.
 - 1. American Concrete Institute (ACI)
 - a. As indicated in Section 03 3000, Cast-In-Place Concrete and as specified herein.
 - 2. American Welding Society (AWS)
 - a. AWS D1.4 Structural Welding Code - Reinforcing Steel, latest edition.
 - 3. Concrete Reinforcing Steel Institute (CRSI), latest edition.
 - a. Placing Reinforcing Bars

- b. Reinforcement Anchorages and Splices
 - c. Fabrication of Epoxy-Coated Rebar
 - d. Field Handling Techniques for Epoxy-Coated Rebar at the Job Site
 - e. Manual of Standard Practice
- 4. Wire Reinforcement Institute (WRI), latest edition.
 - a. Manual of Standard Practice - Structural Welded Wire Fabric
 - b. Structural Detailing Manual
- 5. American Society for Testing and Materials (ASTM), latest edition.
 - a. As specified herein.

1.5 Quality Control

- A. Materials and installed Work may be reviewed by Engineer at any time during progress of Work. Allow free access to facilities for this purpose. Provide 48 hours notice to inspect completed reinforcing prior to placement of concrete.
- B. If in opinion of Engineer, cross-sectional area loss of bars is greater than 15 percent, Contractor shall splice as directed by Engineer. Minimal splice lap shall be as indicated on Drawings.

1.6 Submittals (ACI 301 3.1.1) Additional requirements as follows:

- A. For review and approval, Safety Data Sheets and Manufacturer's Spec Data Sheets for field-applied epoxy coating.
- B. For review and approval upon request certification that epoxy coating for steel reinforcement meets applicable standards.

1.7 Transportation and Handling (ACI 301 3.12) Additional requirements as follows:

- A. Store reinforcement on supports above ground level. Protect from weather.
- B. Epoxy-coated reinforcement
 - 1. Comply with requirements of ASTM D 3963/D 3963M-96 Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars and CRSI Field Handling Techniques for Epoxy-Coated Rebar at the Job Site.
- C. If reinforcement is to be stored on site for more than 1 month before placement, cover reinforcement with opaque polyethylene sheeting, properly secured. Do not store reinforcement at job site unprotected over winter.

1.8 Basis of Payment

- A. Reinforcement is to be included in cost of concrete placement.
- B. Cleaning and coating of existing reinforcement shall be incidental to cost of concrete demolition and replacement.

PART 2 - PRODUCTS

2.1 Materials (ACI 301 3.2.1) Additional requirements as follows:

- A. Reinforcement
 - 1. ASTM A615, grade 60, unless noted.
- B. Epoxy-Coated Reinforcement
 - 1. ASTM A775.
- C. Welded Wire Fabric Reinforcement (rolls not accepted)
 - 1. ASTM A884, Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
- D. Wire Reinforcement Supports (ACI 301 3.2.1.8)
 - 1. Provide CRSI Class 1-A epoxy, vinyl, or plastic-coated bright basic wire bar supports for epoxy reinforcement in contact with formwork, including bolsters, chairs, spacers and other devices for spacing, supporting, and fastening reinforcing bars in place.
- E. Tie Wire
 - 1. Tie wire shall be plastic or vinyl coated for all epoxy coated reinforcement.
- F. Epoxy-Coating for Reinforcement
 - 1. Location of epoxy-coated reinforcement is described in General Notes.
 - 2. Brown or red coatings are not permitted.
 - 3. Fabrication of epoxy-coated reinforcement shall conform to ASTM D 3963/D 3963M and CRSI Fabrication of Epoxy-Coated Rebar.
 - 4. Acceptable shop-applied fusion-bonded epoxy coatings are:
 - a. Scotchkote 413, The 3M Company
 - b. NAP-GARD 7-2709 Rebar, DuPont Power Coatings
 - c. or Approved Equivalent.
- G. Epoxy Patch Compound
 - 1. Use patching compounds recommended by epoxy powder Manufacturer, compatible with shop applied epoxy coating and inert in concrete.

2. Acceptable patching compounds are:
 - a. Scotchkote 413PC, The 3M Company
 - b. NAP-GARD Rebar Repair Material 7-2727, DuPont Powder Coatings

H. Field-Applied Epoxy Modified Coating

1. Field-applied epoxy modified coating with Anti-Corrosion Agent (two coats at 10 mils) for existing reinforcement and miscellaneous metals embedded in concrete.
2. Acceptable field applied epoxy modified coatings are:
 - a. Sika Armatex 110 Epo Cem, Sika Corporation.
 - b. MasterEmaco P 124, BASF, Shakopee, MN.
 - c. Mapei Mapefer 1k, Mapei, Deerfield Beach, FL
 - d. Dualprep A.C., Euclid Chemical Company, Cleveland, OH.

PART 3 - EXECUTION

3.1 Inspection

- A. Inspect area to receive Work and report immediately in writing to Engineer, as required in General Conditions, any unacceptable conditions.

3.2 Fabrication

- A. Fabrication tolerances shall be in accordance with ACI 117 2.1.

3.3 Placement (ACI 301 3.3.2) Additional requirements as follows:

- A. Tolerances (ACI 301 3.3.2.1)
 1. Comply with Concrete Reinforcing Steel Institute's recommended practice for Placing Reinforcing Bars, for details and methods of reinforcement placement and supports, and as herein specified.
- B. Reinforcement supports (ACI 301 3.3.2.4)
 1. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces so that concrete cover for tie wire matches cover for reinforcement.
 2. Supports for bars shall be placed at 4'-0" maximum spacing. Supports shall be placed a maximum of 6 inches from ends of the reinforcement.
- C. Welded wire reinforcement (ACI 301 3.3.2.5)

1. Install in lengths as long as practical. Offset end laps in adjacent widths to prevent continuous laps in either direction.
2. Supports for welded wire fabric shall be placed at 2'-0" maximum spacing.

3.4 Epoxy Coating Inspection and Repair

- A. Uncoated ends of reinforcement must be coated at job site.
- B. Repair is required of all visible damaged areas, if one percent or less of surface area of coating in any three (3) foot length of reinforcement is damaged. If more than one percent of surface area is damaged, reinforcement shall be replaced.
- C. Repair damaged epoxy coating as Engineer directs. Repair shall be performed a minimum of 24 hours prior to concrete placement, unless Contractor submits Manufacturer's data indicating lesser curing time.
- D. Repair of epoxy coating shall not be carried out when temperature of reinforcement or ambient air is 5 degrees C. or below, or when moisture is present.
- E. Inspection and acceptance of epoxy coated reinforcement will be per CRSI Guidelines for Inspection and Acceptance of Epoxy-Coated Reinforcing Bars at the Job site.

3.5 Existing Reinforcement

- A. Existing reinforcement and miscellaneous metal to remain shall be cleaned of rust and laitance to Near White Metal and field epoxy coated in accordance with epoxy coating Manufacturer's recommendations.
- B. Loose reinforcement bars shall be secured by either tying to bonded reinforcement or drilling supplemental anchors and installing tie downs. Lead anchors are not permitted.
- C. Field-applied epoxy cure time must be extended as directed by Engineer during cold weather application.
- D. Field-applied epoxy must be properly cured in a non "tacky" condition prior to concrete placement.
- E. Remove epoxy spillage from adjacent concrete surfaces.

END OF SECTION 03 2000

SECTION 03 3000 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 Related Documents

- A. Conditions of Contract for Construction and General Requirements of Division 1 of these Specifications apply to Work in this Section.
- B. ACI 301, Specifications for Structural Concrete and ACI 117 Standard Specifications for Tolerances for Concrete Construction and Materials are hereby a part of this Section. Specific project requirements or modifications are specified herein.

1.2 Work Included

- A. Work in this Section shall include all equipment, materials, labor, and supervision to install cast-in-place concrete as indicated on Drawings and as specified herein.
- B. Remove and reinstall all electrical conduit, mechanical conductors, light fixtures, mechanical equipment, signs, etc. necessary for proper completion of repairs.
- C. Concrete repair materials.

1.3 Related Work

- A. Work related to this Section:
 - 1. Selective Demolition Section 02 4119
 - 2. Concrete Repair Section 03 0130
 - 3. Concrete Formwork Section 03 1100
 - 4. Concrete Accessories Section 03 1500
 - 5. Concrete Reinforcement Section 03 2000
 - 6. Shotcrete Section 03 3713
 - 7. Traffic Coatings Section 07 1800
 - 8. Joint Sealants Section 07 9200

1.4 Reference Standards and Cited Publication. (ACI 301 1.3) Additional standards as follows:

- A. American Concrete Institute (ACI)
 - 1. ACI 201.2R Guide to Durable Concrete.
 - 2. ACI 222R Corrosion of Metals in Concrete.
 - 3. ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

4. ACI 212.4R Guide for the Use of High-Range Water Reducing Admixtures (Superplasticizers) in Concrete.
 5. ACI 221.R State-of-the-Art Report on Alkali – Aggregate Reactivity
 6. ACI-302.1R Guide for Concrete Floor and Slab Construction.
 7. ACI 304R Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 8. ACI 305R Hot Weather Concreting.
 9. ACI 306R Cold Weather Concreting.
 10. ACI 308 Standard Practice for Curing Concrete.
 11. ACI 311.5R Guide for Concrete Plant Inspection and Field Testing of Ready-Mixed Concrete.
 12. ACI-318 Building Code Requirements for Structural Concrete.
 13. ACI 362.1R Guide for the Design of Durable Parking Structures.
 14. ACI 515.1R Guide to the Use of Waterproofing, Dampproofing, Protective and Decorative Barrier Systems for Concrete.
 15. ACI SP 66 Detailing Manual.
 16. ACI Concrete Craftsman Series.
 17. ACI CP-10 Craftsman Workbook for ACI Certification of Concrete Flatwork Technician Finisher.
- B. Federal Highway Administration
1. FHWA-RD-77-85, Sampling and Testing for Chloride Ion in Concrete.
- C. American Association of State Highway Transportation Officials (AASHTO)
1. AASHTO T 260, Method of Sampling and Testing for Total Chloride Ion in Concrete and Concrete Raw Materials.
 2. AASHTO T 318, Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying.
- D. American Society of Testing Materials (ASTM)
1. As specified herein.

1.5 Quality Assurance (ACI 301 1.6) Additional requirements as follows:

- A. General (ACI 301 1.6.1)
1. Perform all Work in strict accordance with laws and regulations of applicable Building Codes and with all other authorities having jurisdiction, that take precedence over requirements of this Specification, except where requirements of Specifications are more exacting or stringent, they shall govern.
- B. Testing responsibilities of Contractor (ACI 301 1.6.3).
1. Provide Owner's Testing Laboratory, for their review, proposed mix designs, including samples for tests of:
 - a. Air content.
 - b. Chloride permeability.
 - c. Plastic and hardened concrete corrosion inhibitors.
 2. Advise Owner's Testing Laboratory minimum of 48 hours in advance of operations.
 3. Report any testing irregularities to Engineer.
 4. Patch holes resulting from concrete coring, matching adjacent areas.

5. Concrete mix designs shall also be reviewed and approved by the admixture Manufacturer.
 6. If, at any time during construction, it is desired to deviate from approved mix designs, Contractor's Testing Laboratory shall modify mix design, subject to Engineer's approval.
- C. Admixture Manufacturer shall make available a qualified Manufacturer's Representative to assist Contractor and Engineer as specified in this Section.
- D. Corrosion Inhibitor Dispensing Requirements:
1. Ready-Mix Supplier shall have corrosion inhibitor Manufacturer's Representative perform following:
 - a. Install visual reference (such as bottle or other approved device) for dispensing Calcium Nitrite corrosion inhibitor. Visual reference shall be accessible to Owner's Testing Laboratory, Manufacturer's Representative, and Engineer.
 - b. Calibrate dispensing system at initial equipment installation and annually thereafter. Install tamperproof seals after each calibration of system.
 2. Ready-Mix Supplier shall perform following:
 - a. Verify contents of visual reference prior to discharge of product for each batch. If visual reference does not indicate specified amount of corrosion inhibitor, Ready-Mix Supplier shall stop production and notify corrosion inhibitor Manufacturer/Supplier immediately.
 3. Owner's Testing Laboratory (Ready-Mixed Supplier) shall perform following:
 - a. Prior to and after each pour, take volume readings of corrosion inhibitor tank, correlate to size of pour, and report results to Engineer, Manufacturer/Supplier, and Ready-Mix Supplier. Volume used shall be within +/- 10% of specified amount.
- E. Admixtures shall be from single manufacturer, where possible. A letter shall be issued from several manufacturers certifying compatibility with all ingredients in the proposed mix design.
- F. A minimum of one concrete finishing crew member shall be an ACI Certified Concrete Flatwork Finisher or equivalent for all slabs on grade and supported slabs. Equivalent finisher certification programs shall include both written and performance examinations. Certified finisher shall have input to crew's placement and finishing procedures regarding application of ACI Standards for quality flatwork. Contractor shall designate a certified finisher in advance of operations and warrant continued participation. Applicable standards are contained in ACI "Concrete Craftsman Series."
- G. Nondestructive tests will not be permitted to determine in-place strength.
- H. Contractor, or Restoration Subcontractors, shall have not less than two (2) years experience in the field of structural concrete restoration work.
- I. Repaired areas shall be sounded by Contractor with a chain drag or hammer seven (7) days after concrete placement. Contractor shall repair all hollowness detected by removing and replacing patch or affected area at no extra cost to Owner.
- J. Maintain plan drawing locating all concrete repairs performed under this Section. Location and size of patches, overlays, etc. must be located on clean drawing. Separate drawing shall be maintained for each Level and ceiling plan.

1.6 Submittals (ACI 301 Submittals Checklist) Additional Submittal requirements as follows:

- A. For review and approval mix designs on each class of concrete a minimum of three (3) weeks prior to placing concrete. Mix designs shall be prepared in accordance with ACI 301. Proportions shall be in accordance with ACI 211.1. Use attached "Concrete Mix Design Submittal Form" at end of this Section and also provide all material data identified in "Required Attachments" for the concrete mix design submittal.
- B. All submitted material data shall be representative of concrete to be supplied and shall be current to the Work (i.e. tested within past 3 months of award date of contract).
- C. For review and approval a warrant of design mix(s), stating that they are totally representative of concrete(s) to be supplied and that they meet requirements of Contract Documents.
- D. For review and approval new design mixes when any change in materials are required or necessary.
- E. For record upon request concrete delivery tickets.
- F. For review and approval all materials and methods for concrete curing.
- G. For review and approval upon request cold weather placement procedures.
- H. For review and approval upon request wet weather protection procedures.
- I. For review and approval upon request hot weather placement procedures.
- J. For review and approval prior to making structural repairs to concrete, patching materials to be used and method of application.
- K. For record upon request, a written description of Contractor's concrete repair ability, including equipment, facilities, personnel, and a list of similar completed projects.
- L. For review and approval upon request of bonding grout mix design.

1.7 Materials Storage and Handling (ACI 301 4.1.4) Additional requirements as follows:

- A. Store materials on platforms off ground; protect stored cement against elements. Handle and store aggregates separately in a manner to prevent intrusion of foreign material. Protect all material until used. Any materials which have deteriorated or have been damaged shall not be used.

1.8 Basis of Payment

- A. All patching quantities shall be measured on a square foot basis; estimated depth of patch as indicated on Drawings.

- B. Submit copy of drawings identifying current quantities with each payment request. Work being invoiced must be properly identified. These drawings shall be incorporated into record set required per Division 1.

PART 2 - PRODUCTS

2.1 Products (ACI 301 4.2) Additional requirements as follows:

- A. Cementitious Material (ACI 301 4.2.1.1)
- B. Aggregates (ACI 301 4.2.1.2)
 - 1. Aggregates shall have a total water soluble chloride ion content below 0.02 percent by weight of aggregate, unless a higher limit is approved by Engineer by adding corrosion inhibitor to mixture to offset additional chloride ion.
 - 2. Coarse aggregate shall consist of gravel, crushed gravel, crushed stone, or other approved inert materials of similar characteristics, meeting ASTM C 33 class designation as follows:
 - a. Columns, beams, slabs, walls, and all other members: Class 5S.
 - 3. Acceptance of aggregate for freeze thaw characteristics shall be based on past performance in concrete under similar conditions (freeze thaw, road salts) over five winters or when concrete is tested in accordance with ASTM Standard C 666.
 - 4. Acceptance of aggregate for shrinkage characteristics shall be based on its past performance in concrete under similar conditions, or when concrete is tested in accordance with ASTM C 157 and ASTM C 469.
 - 5. Acceptance of aggregate for alkali-aggregate reaction (AAR) which includes alkali-silica reaction (ASR) and alkali-carbonate rock reaction (ACR) shall be based on past performance in concrete under similar conditions, or when the aggregates are examined by petrographic examination ASTM C 295, and/or rock cylinder test ASTM C 586, and/or prism test ASTM C 1105 and/or tested in accordance with one or more of ASTM Standards C 1260, C 1293 or C 1567.
- C. Admixtures (ACI 301 4.2.1.4)
 - 1. Admixtures shall be used to provide proper workability, finishability, and setting times at low water-cementitious ratios and to increase compressive strength, of concrete as approved by Engineer.
 - 2. Use approved admixtures and dosage rates as necessary unless indicated otherwise on Drawings. Use in strict accordance with Manufacturer's recommendations. Admixtures shall be added at separate intervals or locations of mix cycle.
 - 3. Air entraining admixtures: specific admixture to be selected by Admixture Representative and approved by Engineer.
 - a. ASTM C 260
 - b. Acceptable materials are:
 - 1) Sika AIR Series, AEA-14 or AEA-15, Sika Corp.
 - 2) Darex or Daravair Series, GCP Applied Technologies
 - 3) MB or Micro-Air Series, BASF Admixtures
 - 4) AEA, Air Mix or Eucon Air Series, Euclid Chemical Company
 - 5) Catexol Series, Axim Italcementi Group
 - 6) or Approved Equivalent.

4. Chemical Admixtures: specific admixture to be selected by Admixture Representative and approved by Engineer.
 - a. Water reducing admixtures
 - 1) ASTM C 494, Type A
 - 2) Acceptable materials are:
 - a) Plastocrete, Sika Corp.
 - b) WRDA or ADVA Series, GCP Applied Technologies
 - c) Pozzolith Series, BASF Admixtures
 - d) Eucon Series, Euclid Chemical Company
 - e) Catexol Series, Axim Italcementi Group
 - f) or Approved Equivalent.
 - b. Midrange water reducing admixture conventional slump concrete 6" – 8".
 - 1) ASTM C 494, Type A.
 - 2) Use shall not change the requirement of:
 - a) Water/cementitious ratio
 - b) Concrete strength
 - c) Air content
 - d) Specification for placing, finishing, and curing
 - c. Acceptable materials are:
 - 1) Sikament AFM or Sikament 686, (Sikament Series), Sika Corp.
 - 2) Daracem, MIRA, or ADVA Series, GCP Applied Technologies
 - 3) Polyheed Series, BASF Admixtures
 - 4) Eucon Series, Euclid Chemical Co.
 - 5) Catexol Series, Axim Italcementi Group
 - d. High range water reducing admixture 6" – 10" slump concrete.
 - 1) ASTM C 494, Type F or G
 - 2) Use shall not change requirement of:
 - a) Water/cementitious ratio
 - b) Concrete strength
 - c) Air content
 - d) Specification for placing, finishing, and curing
 - 3) Acceptable materials are:
 - a) Sikament AFM or Sikament 686, (Visocrete Series), Sika Corp.
 - b) ADVA or Daracem Series, GCP Applied Technologies
 - c) Glenium Series or Rheobuild 1000 or 716, BASF Admixtures
 - d) Eucon or Plastol Series, Euclid Chemical Company.
 - e) Catexol Series, Axim Italcementi Group
 - e. High range water reducing admixture (superplasticizer): self-consolidating concrete.
 - 1) ASTM C 1017 Type I or II
 - 2) Use shall not change requirements of:
 - a) Concrete strength
 - b) Air content
 - c) Specification for placing, finishing and curing
 - 3) Acceptable materials
 - a) Sikament 300 or 686, (Visocrete Series), Sika Corp.
 - b) ADVA or Daracem Series, GCP Applied Technologies
 - c) Glenium Series, BASF Admixtures
 - d) Plastol Series, Euclid Chemical Company.
 - e) Catexol Series, Axim Italcementi Group

- f) or Approved Equivalent.
 - f. Non-corrosive non-chloride accelerator:
 - 1) ASTM C 494, Type C or E
 - 2) Admixture shall not contain more chloride ions than are present in municipal drinking water. Admixture Manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year's duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures.
 - 3) Acceptable materials are:
 - a) Plastocrete 161 FL or Sikaset NC, (SikaSet Series), Sika Corp.
 - b) Daraset Series, Lubricon NCA, DCI, or Polarset, GCP Applied Technologies
 - c) Pozzutec Series, BASF Admixtures
 - d) Accelguard Series, Euclid Chemical Co.
 - e) Catexol 2000RHE, Axim Italcementi Group
 - g. Calcium Nitrite-Based Corrosion Inhibitor
 - 1) ASTM C 494 Type C
 - 2) Acceptable materials are:
 - a) Sika CNI, Sika Corp.
 - b) DCI or DCI-S Corrosion Inhibitor, GCP Applied Technologies
 - c) Rheocrete CNI, BASF Admixtures
 - d) Catexol 1000 CN-CI, Axim Italcementi Group
 - e) Eucon CIA, Euclid Chemical Company
- D. Mineral Admixtures
- 1. Fly ash:
 - a. Fly ash, if used, shall not exceed 25 percent by weight of total cementitious material weight in mix design. Fly ash shall conform to ASTM C 618, including optional requirements on available alkalis, Class C or F, sampling and testing per ASTM C 311. Loss of ignition (carbon content) shall be limited to 4 percent.
 - b. Use of fly ash shall not alter specified levels of air entrainment nor reduce strength requirements for any mix.
 - 2. Silica Fume:
 - a. Silica fume shall conform to ASTM C 1240 requirements as a liquid slurry or dry densified.
 - b. Acceptable materials are:
 - 1) Sikacrete 950 DP, Sika Corp.
 - 2) Force 10,000 or Force 10,000-D, GCP Applied Technologies
 - 3) Rheomac SF100, BASF Admixtures
 - 4) Eucon MSA, Euclid Chemical Company
 - 5) Catexol SF-D, Axim Italcementi Group
 - 6) or Approved Equivalent.
 - c. Self disintegrating bags designed to be disposable in batch are prohibited.
- E. Ground Granulated Blast-Furnace Slag (GGBS):
- 1. Ground Granulated Blast-Furnace Slag, if used, shall not exceed 40 percent by weight of total cementitious material in mix design.
 - 2. Ground Granulated Blast-Furnace Slag shall conform to ASTM C 989, Grade 100 or higher.

- F. Maximum percent of Total Cementitious Materials:
 - 1. Where both flyash and slag are used in a mix design their total shall not exceed 35 percent by weight of the total cementitious material in the mix design for slabs and 50% for formed members.
 - 2. Where flyash, slag and silica fume are all used a single mix design total shall not exceed 42 percent by weight of the total cementitious material in the mix design.
- G. Macro Synthetic Fibers – Post Crack Control for concrete members and floor systems.
 - 1. Monofilament Polypropylene/Polyethylene blend. 2" in length. Dosage rate as indicated on Drawings.
 - 2. Tensile strength of fiber shall be a minimum of 90 ksi.
 - 3. Modulus of Elasticity shall be a minimum of 1300 ksi.
 - 4. Meet requirements of ASTM C 1609 and have a minimum Re3 Value of 20.
 - 5. Acceptable materials are:
 - a. STRUX 90/40 Synthetic Macro Fiber Reinforcement, GCP Applied Technologies
 - b. Fibermesh 650 Macrofibers, Propex Concrete Systems
 - c. Tuf-Strand SF, Euclid Chemical Company
 - d. Forta Ferro, Forta Corporation
 - e. Or Approved Equivalent.
- H. Fibrous Concrete Reinforcement – Plastic Crack Control
 - 1. 100% virgin polypropylene (Collated fibrillated monofilament materials): Dosage rate 1.5#/cu. yard of concrete minimum, containing at least 3 million individual fibers.
 - 2. 100% virgin polypropylene (Fibrillated microfilament materials): Dosage rate 1.0 #/cu. yard of concrete minimum, containing at least 25 million individual fibers. Minimum length shall be 0.75 in.
 - 3. Meet minimum plastic shrinkage crack reduction of 70% when tested in accordance with ICBO ES, Appendix B(7-92)
 - 4. Meet requirements of ASTM C1116, "Standard Specification for Fiber-Reinforced Concrete and Shotcrete", designation Type III, 4.1.3.
 - 5. Acceptable materials are:
 - a. Gilco, Grace Fibers or Grace Micro Fibers, GCP Applied Technologies
 - b. Fibermesh Inforce e3 or Stealth e3, FibreMesh Co., Chattanooga, TN
 - c. Forta Fiber-CFP, Forta Corp., Grove City, PA
 - d. Axim Fibrasol F, Axim Concrete Technologies
 - e. Fiberstrand, The Euclid Chemical Company
 - f. Sika Fiber, Sika Corp.
 - g. or Approved Equivalent.

2.2 Performance and Design Requirements (ACI 301 4.2.2) Additional requirements are as follows:

- A. Coarse Aggregate: - (ACI 301 4.2.2.3)
 - 1. Maximum aggregate size and ASTM C 33 gradation requirements (4.2.2.3):
 - a. All members 3/4 inch, size 67.
- B. Air content – (ACI 301 4.2.2.4)
 - 1. As specified on Drawings.

2. Plastic air test shall be performed by pressure method, ASTM C 231 or volumetric method, ASTM C 173. Verify air content with unit weight test.
- C. Admixtures – (ACI 301 4.2.2.5)
 1. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions by weight of cement are not permitted. No admixture shall cause an increase in shrinkage when tested in accordance with ASTM C 157.
- D. Chloride-ion Concentration – (ACI 301 4.2.2.6)
 1. Total soluble chloride-ion content by weight of cement and of concrete shall be provided (for prestressed concrete, floor topping on precast). Total soluble chloride ion content of concrete shall be tested in accordance with AASHTO Method T260 for each proposed mix design. Percent by weight of cement of total soluble chloride ion content shall be below limits specified on Drawings. This includes contributions from all ingredients. Alternately, water soluble chloride ion content shall be tested in accordance with ASTM C 1218. Percent by weight of cement of water soluble chloride ion content shall be below limits specified on Drawings. This includes contributions from all ingredients. If specified limits are exceeded, additional testing for water soluble chloride ion content shall be performed using Soxhlet method in accordance with ACI 222.1. In event that any concrete mix has water soluble chloride ion content in excess of specified limits for that mix, appropriate amounts of calcium nitrite shall be added to offset its effects. Ready-Mix Supplier shall provide laboratory test results indicating amount of excess chloride ion content in concrete mixture contributed by aggregates. For each pound of chloride ion in excess of amount allowed, mix shall contain calcium nitrite (30% +/- 2%, solids content) on a one-to-one basis (one gallon of calcium nitrite for one pound of excess chloride ion). Maximum of 1.5 lbs. of chloride ion per cubic yard may be offset in this manner.
 - a. Water soluble chloride ion content of mix including all constituents shall not exceed limits as indicated on Drawings, unless a higher limit is approved by Engineer and corrosion are inhibitors added to mixture to offset additional chloride.
 - b. If specified level of water soluble chloride ion content cannot be maintained, appropriate level of calcium nitrite admixture shall be added to mix in accordance with above at no additional cost to Owner.
- E. Mix Designs with Silica Fume
 1. Additional Mix Design Requirements:
 - a. Ready-Mix Supplier and Owner Testing Laboratory shall independently perform air content tests of silica fume mix design in accordance with ASTM C 231 or ASTM C 173. Verify air content with unit weight test.
- F. Mix Designs with Corrosion Inhibitor
 1. Additional Mix Design Requirements
 - a. Ready-Mix Supplier and Owner's Testing Laboratory shall independently perform air content testing of mix design in accordance with ASTM C 231 or ASTM C 173.
 - b. Corrosion inhibitor Supplier and Owner's Testing Laboratory shall independently perform plastic concrete corrosion inhibitor testing of mix design in accordance with test method for Calcium Nitrite Presence in Plastic Concrete indicated in Appendix A of Specification Section 01 4100.
- G. Strength and Water-Cementitious material ratio – ACI 301 4.2.2.9
 1. As scheduled on Drawings.

2. Weight of fly ash, silica fume and GGBS additives shall be included with weight of cement to determine water-cementitious materials ratio.

2.3 Measuring, Batching, and Mixing (ACI 301 4.3.1) Additional requirements as follows:

- A. Ready Mix Concrete
 1. Furnish delivery ticket with each load of concrete delivered. In addition to requirements of ASTM C 94 Section 16, provide following information on delivery tickets:
 - a. Type of aggregate
 - b. Total water content
 - c. Air Entrainment
 - d. Slump
 - e. Silica fume (if used) admixture content per cubic yard of concrete
 - f. Fly ash (if used) content per cubic yard of concrete
 - g. GGBS (if used) content per cubic yard of concrete
 - h. Water-cementitious materials ratio
 - i. Corrosion inhibitor
 - j. High Range Water reducing admixture
 - k. Fibrous concrete reinforcement
- B. Slump adjustment (ACI 301 4.3.2.1).
 1. ASTM C 143. Contractor will provide slump guidelines adhering to strength and water/cementitious ratio requirements. Mix design shall provide water slump for concrete and after addition of superplasticizers.
 2. Water is not to be added at site to meet specified slump, unless specifically indicated as being withheld on concrete batch ticket and approved by Engineer.
 3. High range water reducing admixtures (superplasticizers), if added at batch plant, may be redosed at job site. Manufacturers should provide a redosage chart for this purpose. If superplasticizers are added at batch plant, concrete delivery time, placement, and finishing procedures shall account for limited time affect. If superplasticizer is added at site after verification of initial slump, concrete shall be completely retested after proper mixing. All concrete containing superplasticizer shall have a maximum nine (9) inch slump unless otherwise approved by Engineer.
- C. Time of Discharge (ACI 301 4.3.2.2)
 1. All concrete trucks shall not have concrete build-up on drum or have worn fins. Engineer may require inspections to verify conformance to NRMCA Quality Control Manual, Section 3.
 2. Time of discharge after batching shall not exceed 90 minutes or after drum has revolved 300 revolutions unless otherwise approve by Engineer.
- D. Air content tests shall be taken of concrete at point of discharge unless otherwise approved by Engineer.
- E. Silica Fume Concrete - Additional Mixing Requirements
 1. Sequence and method of charging mixer, transportation, discharging and placement of silica fume concrete shall be reviewed with silica fume Manufacturer's Representative.
 2. For all types of mixing equipment, mix times shall be increased by 40% over minimum mix time required to achieve mix uniformity as defined by ASTM C 94.

3. For truck-mixed and central mixed silica fume concrete, maximum allowable batch size shall be 80% of maximum as called out by ASTM C 94.
- F. Fibrous Concrete Reinforcement - Additional mixing requirements
 1. Fibers shall be added at a maximum rate of 4 lbs per cubic yard of concrete as indicated on Drawings, Specification, or as approved by Engineer in accordance with Manufacturer's recommendations and within time and location of initial concrete batching as specified in ASTM C 94.
- G. Volumetric Batching/Continuous Mix Concrete (ACI 301 4.3.1.2) - Additional requirements as follows:
 1. Batch tickets are to accompany each batching operation and shall be kept on site. Batch tickets must indicate information as specified herein, or be subject to rejection.
- H. Prepackaged Materials Used in Concrete (ACI 301 4.3.1.3)
 1. Mixing and installing of concrete patching materials and priming of existing concrete surface shall be in accordance with Manufacturer's recommendations.
 2. Site mixing operation shall be approved by Manufacturer and produce sufficient concrete so that placement and finishing operation can proceed at a steady pace.

PART 3 - EXECUTION

3.1 General (ACI 301 5.1) Additional requirements as follows:

- A. Placement notification (ACI 301 5.1.2.2.b) notify Owner's Testing Laboratory and Engineer 48 hours in advance of concrete operations.
- B. Before placement of concrete, formwork shall have been completed, foreign material shall have been removed, reinforcement shall have been secured in place, and entire preparation shall have been reviewed by Engineer.

3.2 Materials (ACI 301 5.2.1) Additional requirements as follows:

- A. Curing compounds
 1. Curing Compounds (ACI 301 5.2.1.1)
 - a. Acceptable only for use on vertical and overhead repairs.
 - b. Curing and Sealing Compound (A.I.M. Regulations – VOC Compliant, 700 g/l): Liquid type membrane-forming curing compound, clear styrene acrylate type, complying with ASTM C 1315, Type I, Class B, 25% solids content minimum.
 - 1) Moisture loss shall be not more than 0.30 Kg/m² when applied at 300 square feet/gallon.
 - 2) Application rate per ASTM C 1315.
 - 3) Manufacturer's certification is required.
 - 4) Acceptable materials are:
 - a) "Super Diamond Clear or Super Diamond Clear AC" by The Euclid Chemical Company

- b) "Masterseal 30" by BASF
 - c) "Kure N Seal 30" by Sonneborn
- B. Waterproof Sheet Materials – (ACI 301 5.2.1.2)
 - 1. Acceptable materials are:
 - a. Waterproof paper over burlap.
 - b. White polyethylene film over burlap.
 - c. White polyethylene-coated burlap.
- C. Evaporation Retarder
 - 1. Acceptable materials are:
 - a. Sika Film, Sika Corporation
 - b. Confilm, BASF Ad mixtures
 - c. Eucobar, Euclid Chemical Company
 - d. E-Con, L & M Construction Chemicals, Inc.
 - e. or Approved Equivalent.
- D. Grout
 - 1. Non-precision, non-shrink, non-stain. non-metallic grout in strict accordance with Manufacturer's recommendations.
 - a. ASTM C 1107 strength as noted on Drawings.
 - b. Color of cured grout used on cast-in-place shall match color of surrounding concrete. Note silica fume concrete surfaces will be darker than conventional concrete.
 - c. Note: If products are unable to provide color match, then alternate products will be subject to the approval of the Engineer.
 - 2. Acceptable materials are:
 - a. Sika Grout 212, Sika Corp.
 - b. Construction Grout, BASF Building Systems
 - c. NS Grout, Euclid Chemical Company
 - d. Duragrout, L & M Construction Chemicals, Inc.
 - e. or Approved Equivalent.
 - 3. When high fluidity precision grout and/or increased placing time is required, use high flow grout. Acceptable materials are:
 - a. Sika Group 328, Sika Corporation
 - b. Masterflow 928, BASF Building Systems
 - c. Hi-Flow Grout, Euclid Chemical Company
 - d. or Approved Equivalent.

3.3 Preparation (ACI 301 5.3.1) Additional requirements as follows:

- A. Before placement of repair material pre-dampen surfaces of cavities. Surfaces shall have no standing water during the concrete pour.
- B. Coordinate Work with other trades to allow reasonable time to set sleeves, inserts and other accessories.
- C. Conveying Equipment (ACI 301 5.3.2.3)
 - 1. Pump hoses shall be supported independently and not laid on reinforcement.

- D. Consolidating (ACI 301 5.3.2.5)
 - 1. Vibrators must not be allowed to touch reinforcement embedded in partially set concrete. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
- E. Bonding Grout
 - 1. All concrete bonding surfaces must be abrasive blasted to a clean sound substrate prior to concrete placement.
 - 2. Bonding grout shall be pneumatically (brush) applied to existing concrete bonding surface immediately prior to concrete placement. Bonding grout shall be applied evenly to a uniform minimum thickness of 1/16 inch to 1/8 inch throughout. Grout shall not be allowed to dry or dust prior to placement of repair material.
 - 3. Provide one (1) shop vacuum capable of removing water from repair cavity prior to bonding grout application.
- F. Surface Applied Corrosion Inhibitor
 - 1. Prior to placement of concrete slab patch, apply surface applied corrosion inhibitor evenly to clean and dry patch perimeter surface using three applications. Each application shall be at a rate of 125 SF per gallon in accordance with Manufacturer's written procedures.
- G. If construction joints are permitted, new concrete placement shall not be until contact surface of concrete in place has been swept with a stiff brush or scraped to remove laitance and roughened. One hour prior to concrete placement, pre-wet bonding surface or soil with a uniform spray application of water. Surface shall be maintained in a damp condition, puddles shall be blown clean. Bonding surface shall then be coated with a thin layer of bonding grout immediately prior to placement of concrete. Bonding grout shall be worked into bonding surfaces with stiff brooms or brushes.

3.4 Placement of Concrete (ACI 301 5.3.2) Additional requirements as follows:

- A. Cold Weather (ACI 306.1, ACI 301 5.3.2.1.b)
 - 1. Record air temperature no less than twice per 24 hour period.
 - 2. Cast expendable thermostats or thermo-couplers in concrete at rate of at least one per 100 cubic yards of concrete placed for supported structure. Monitor internal temperature of concrete at twelve hour maximum intervals throughout curing process.
 - 3. Record temperature of concrete for each batch as delivered.
 - 4. Mix water, sand, and aggregate may be warmed so that no frozen lumps of ice, snow, or aggregate will survive mixing but do not overheat ingredient to cause flash setting of concrete or loss of entrained air.
 - 5. Specified non-corrosive accelerator may be used.
 - 6. Do not place concrete unless air temperature is at least 20 degrees F and rising.
 - 7. Use evaporation retarder or water fog after finishing to assure that plastic shrinkage cracking of concrete surface does not occur.
 - 8. Cure shall consist of visqueen and insulated blankets placed on slab as soon as possible after concrete will support them without deformation.

9. Do not wet cure concrete placed under cold weather conditions.
 10. Curing of supported slabs (continuous presence of visqueen and blankets) shall be maintained no less than 10 days.
- B. Hot Weather (ACI 305, ACI 301 5.3.2.1.c)
1. Temperature of concrete as delivered shall not exceed 90°F, unless approved by Engineer.
 2. Forms, reinforcing, and air shall be cooled by water fog spraying immediately before placing concrete.
 3. Protect flatwork during finishing operations as follows:
 - a. Immediately following screeding, apply an evaporator retarding agent in accordance with recommendations of Manufacturer. Additional applications of evaporation retarding agent may be required.
 - b. Continuous fog spray of air above slab between finishing operations.
 - c. Cover concrete with an approved moisture-retaining cover as soon as concrete will support it without deformation. Keep mats constantly wet for 7 days minimum. Leave mats in place for 3 additional days after discontinuing wetting process.
- C. Wet Weather (ACI 301 5.3.2.1a).
- D. Grout used to prime concrete pump and pump line shall not be placed into Work.
- E. During periods of setting, no materials shall be placed and no loads imposed in any manner on slabs. Plank runways for accommodation of workmen or for other traffic shall be supported by blocking.
- F. Construction Joints and Other Bonded Joints (ACI 301 5.3.2.6)
1. Construction of control and isolation joints shall be as located and detailed on Drawings.
 2. Coordinate configuration of tooled joints with joint sealant Manufacturer. Refer to Section 07 9200, Joint Sealants.
 3. Tool slab joints at time of finishing. Saw cutting is not allowed.
 4. Maximum variation between slab surfaces at joints shall not exceed 1/16 inch.
 5. Concrete patches shall be edged to match existing condition (beam and column chamfers, etc.), unless noted.
 6. Bulkheads to limit each pour to predetermined construction joints, shall be set normal and vertical to section to be poured, and shall be left in place until concrete has sufficiently set. Care shall be used when removing bulkheads to prevent spalling of concrete surface. Any concrete passing through bulkhead shall be removed before adjacent pour is made.
 7. Construction or control joints passing through patches shall be tooled through patch for continuity.

3.5 Finishing Formed Surfaces (ACI 301 5.3.3) Additional requirements as follows:

- A. Rough – form finish (ACI 301 5.3.3.3.a)
1. All concealed concrete (i.e. behind masonry, below grade, abutting another structure), may have a “rough form finish.”
- B. Smooth – formed finish (ACI 5.3.3.3.b)

1. All concrete surfaces exposed to public view, both inside and outside structure shall have a "smooth form finish."

3.6 Finishing Unformed Surfaces (ACI 301 5.3.4) Additional requirements as follows:

- A. General
 1. Spraying of water directly on concrete surfaces is NOT allowed.
 2. Use rigid screed rails, wet screeding not accepted.
- B. Float Finish (ACI 5.3.4.2.b):
 1. Flat work in parking and drive areas.
 - a. Begin bull floating immediately after screeding of concrete.
 - b. When bleed water has left surface, begin final "float finish" operation.
- C. Broom or Belt Finish (ACI 301 5.3.4.2.d)
 1. Slab areas to receive a deck coating shall have a "light broom finish," or as recommended and approved by coating Manufacturer and Engineer. Slab areas not receiving a deck coating shall have a medium broom finish. Ridges shall not exceed 1/8 inch in height. Engineer shall be notified to observe and approve final finish texture.
 2. Provide "light broom finish" at stair treads, and a "light broom finish" for stair landings. Texture shall be approved by Engineer.
 3. No refloating or finishing is required after brooming.
- D. Measuring Tolerances for Slabs (ACI 301 5.3)
 1. Parking and drive areas finishing tolerance - During "float finish" operation planeness of surface shall be checked per ACI 117 4.5.7 Classification Straightedged. All high spots shall be cut down and all low spots filled during finish operation.
 2. Stair Towers - Finishing tolerance - During finishing operation, planeness of surface shall be checked per ACI 117 4.5.7, Classification Straightedged.
 3. Finish all concrete slabs to proper elevations to insure that all surface moisture will drain freely to floor drains that no puddle areas exist. Provide positive drainage and maintain headroom clearances as indicated on Drawings. Notify Engineer of grades or clearances which do not allow headroom so adjustments can be made. Contractor shall bear cost of any corrections to provide for positive drainage.
- E. Additional Finishing Requirements as follows:
 1. Finish concrete using procedures to preclude plastic and drying shrinkage cracking. Note the use of low water/cementitious ratio concrete and silica fume and GGBS will essentially eliminate bleed water.
 2. Fog misting air above flat work is recommended. Free standing water is not allowed. No spraying of water directly on flat work will be allowed.
 3. Fog misting is not to be used to apply water to surface of concrete to facilitate lubrication for finishing purposes.
 4. Fog misting is required when conditions of hot weather concrete exist per "Hot Weather Concreting" as specified herein. Fogging shall continue after finishing operation until moisture retaining cover is placed over concrete.
 5. Finish concrete to texture matching approved sample or as required by the deck coating manufacturer.

3.7 Curing and Protection (ACI 301 5.3.6) Additional requirements as follows:

- A. General
 - 1. Curing shall maintain moisture content and temperature to insure strength gain and prevent undesirable cracking, dusting, scaling and crazing.
 - 2. Cure slab-on-grade, supported concrete slabs, concrete topping on precast as follows: Cover concrete with an approved moisture retaining cover as soon as the concrete will support it without deformation. Keep mats constantly wet for 7 days minimum. Leave mats in place for 3 additional days after discontinuing wetting process.
 - 3. Additional precautions may need to be taken to prevent excessive slab moisture loss resulting in plastic shrinkage when any combination of air temperature, concrete temperature, relative humidity and/or wind velocity which causes a rate of evaporation in excess of 0.2 pounds per square feet per hour as determined by ACI 308, Figure 1.
- B. Unformed concrete surfaces: (ACI 301 5.3.6.2)
 - 1. Curing of slab-on-grade may be with curing compound in lieu of moist curing and shall be applied in accordance with ACI 301, 5.3.6.4.e with a minimum of two (2) applications.
 - 2. Curing of supported slabs shall be as ACI 301 5.3.6.4.d, "Application of sheet materials conforming to ASTM C 171. Application of curing compounds is not allowed.
 - 3. For silica fume concrete mixes, curing procedures shall also be in accordance with requirements of silica fume admixture Manufacturer.
 - 4. As a minimum or as recommended by Manufacturer, surfaces of concrete patches shall be protected with a moisture retaining cover, wet burlap as soon as surface will support it without deformation. Maintain burlap in a continuous saturated condition for three days.
 - 5. During curing period repairs shall be protected from traffic. Slab demolition from above or below shall be halted.
 - 6. Prior to reopening repairs to traffic and loading, confirm that the repair concrete has attained a minimum compressive strength of 70 percent of specified 28 day strength. Confirmation is to be made by field cylinder, cured adjacent to, and in a manner similar to the repairs or by the Maturity Method.
- C. Formed Concrete Surfaces (ACI 301 5.3.6.3)
 - 1. Curing of formed surfaces upon early removal of forms shall be in accordance with ACI 301 5.3.6.4, Preservation of Moisture.

3.8 Repair of Surface Defects (ACI 301 5.3.7) Additional requirements as follows:

- A. Match color and texture of concrete to be repaired.
- B. Repair all cracks in supported concrete floor slabs and curbs by routing and sealing or epoxy injection subject to approval of Engineer.
- C. Fill all air pockets and holes over 1/2 inch in diameter with a sand-cement paste. Grind smooth all form offsets or fins over 1/8 inch.
- D. Remove stains, efflorescence, rust, grease and oils, form release agents, dirt, surface deposits, etc.

- E. Low spots, creating puddles and bird baths which impede drainage shall be corrected by smoothing out broom lines, and grinding a drainage path (max 1/4" depth), or by patching with a specified polymer repair material.
- F. High spots impeding drainage in slabs shall be corrected by grinding and re-texturing, subject to approval of Engineer.
- G. Honeycombed and other defective concrete shall be patched with an approved material.
- H. If shrinkage cracks appear in patch material prior to completion of initial 72-hour curing period, patch material shall be considered defective, and it shall be removed and replaced at no extra cost.

3.9 Acceptance of Structure (ACI 301 1.7)

END OF SECTION 03 3000

CONCRETE MIX DESIGN SUBMITTAL FORM

Project: _____ City: _____

General Contractor: _____ Mix Design # _____

Use (Describe): _____

DESIGN MIX INFORMATION:

Field Test Results (Standard Deviation Analysis): _____

or Trial Mix Test Data: _____

Specified Design Characteristics:

Strength _____ psi (28 day); Density: _____ pcf;

Maximum Slump ____ in.; Maximum w/cm _____

Air: ____% specified.

Cementitious Materials:

	Type	(Product Mfr. (Source))
Cement:	_____	_____
Fly ash:	_____	_____
Other:	_____	_____

Aggregates:

	Type	Size
Coarse:	_____	_____
Fine:	_____	_____

Admixtures:

Air Entraining Admixture (A.E.A.): _____

Water Reducing Admixture (W.R.): _____

High Range Water Reducing Admixture (H.R.W.R.):

Accelerator: _____

Silica Fume: _____

Calcium Nitrite-Based Corrosion Inhibitor: _____

Shrinkage Reducing Admixture _____

Fibrous Reinforcement: _____

Latex Emulsion: _____

Other: _____

Mix # _____

Job Name _____

FINAL MIX DESIGN DATA:

<u>MIX PROPORTIONS</u>		
	<u>WEIGHT</u>	<u>ABSOLUTE VOL.</u>
	(lbs)	(cu. ft.)
Cement:	_____	_____
Coarse Aggregate:	_____	_____
Fine Aggregate:	_____	_____
Water:	_____	_____
Entrained Air:	_____	_____
Other:	_____	_____

RATIOS

Fine Agg. _____ lb _____ %
Total Agg. _____ lb

Fly ash to cementitious materials ratio: _____
Silica fume to cementitious materials ratio: _____
Water to cementitious ratio: _____

SPECIFIC GRAVITIES

Fine Agg: _____
Coarse Agg: _____
Other: _____

ADMIXTURES (dosage rate OZ per 100 lb/cement or OZ per/yd)

A.E.A. _____
W.R. _____
HRWR _____
Accelerator _____
Silica Fume _____
Calcium Nitrite-Based Corrosion Inhibitor _____
Fibrous Reinforcement _____
Latex Emulsion _____
Shrinkage Reducer _____
Other _____

**NOTE: Include dosage rate schedule and correlation between dosage of chloride inhibitor and chlorides present in concrete.*

Mix # _____ Job Name _____

PLASTIC CONCRETE

Initial Slump = _____ in.

Air Content = _____ %

Final Slump = _____ in.

Unit Dry Wt. = _____ pcf

Unit Wet Wt. = _____ pcf

STANDARD DEVIATION ANALYSIS (from experience records):

Number of Test Cylinders Evaluated: _____ Standard Deviation: _____

$f_{cr} = f_c + 1.34s$ or $f_{cr} = f_c + 2.33s - 500$ for 5000 psi or less

$f_{cr} = f_c + 1.34s$ or $f_{cr} = 0.90 f_c + 2.33s$ for higher strengths

(Refer to ACI 301 for increased deviation factor when less than 30 tests are available.)

LABORATORY TEST DATA (Hardened Concrete):

COMPRESSIVE STRENGTH

Age (days)	Mix #1 (comp. str.)	Mix #2 (comp. str.)	Mix #3 (comp. str.)
7	_____	_____	_____
7	_____	_____	_____
28	_____	_____	_____
28	_____	_____	_____

28-day average compressive strength: _____ psi

Mix design proportioned to achieve $f_{cr} = f_c + 1200$ psi for 5000 psi or less.

OR $1.10 f_c + 700$ psi for strengths higher than 5000 psi at 28 days.

Remarks:

NOTE: Fill in all blank spaces. Use -0- (Zero) or N.A. (Not Applicable) where appropriate. See "Design and Control of Concrete Mixtures: 13th Edition" by Portland Cement Association, for assistance in completing this form.

Mix # _____ Job Name _____

REQUIRED ATTACHMENTS:

- _____ Concrete compressive strength data used for standard deviation calculations
- _____ Cement mill test reports
- _____ Mill test reports of fly ash chemical and physical analysis and certification of compliance with ASTM C 618 Class C or F
- _____ Certification of silica fume with ASTM C 1240
- _____ Coarse aggregate gradation, deleterious substances and physical property report (ASTM C 33, class designation)
- _____ Coarse aggregate soundness test reports (ASTM C 88)
- _____ Certification aggregate are uniform in quality, gradation, colors and quantity
- _____ Fine aggregate gradation, deleterious substances and physical property report (ASTM C 33)
- _____ Admixture compatibility certification letter
- _____ Admixture Manufacturer's "Product Data Sheets" and "Material Safety Data Sheets"
- _____ Admixture Manufacturer's certification of conformance with appropriate ASTM standards
- _____ Certification of acceptability of coarse and fine aggregate for AAR and ACR performance
- _____ Certification and test results of water soluble chloride ion content FHWA RD-77 or AASHTO T 260-84
- _____ Air content tests of freshly mixed concrete in accordance with ASTM C 231 or ASTM C 173
- _____ Corrosion inhibitor testing of plastic concrete Test Method for Calcium Nitrite Presence in Plastic Concrete (Specification Section 01 4100, Appendix A)

Submitted by Ready-Mix Supplier:

Name _____

Address _____

Phone Number _____

Date _____

Main Plant Location _____

Miles from Project _____

Secondary Plant Location _____

Main Plant Location _____

Miles from Project _____

SECTION 03 3713 – SHOTCRETE

PART 1 - GENERAL

1.1 Related Documents

- A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

1.2 Work Included

- A. The Work of this Section includes furnishing all labor, materials, equipment, and supervision to install shotcrete patching materials as indicated on the Drawings and specified herein:
 - 1. Slab soffit patches
 - 2. Wall patches
 - 3. Beam patches
 - 4. Column patches

1.3 Related Work

- A. The following work is related to this Section.

1. Selective Demolition	Section 02 4119
2. Concrete Repair	Section 03 0130
3. Concrete Formwork	Section 03 1100
4. Concrete Accessories	Section 03 1500
5. Concrete Reinforcement	Section 03 2000
6. Cast-in-Place Concrete	Section 03 3000

1.4 Reference Standards

- A. Comply with the provisions of the latest edition of the following Codes, Specifications, and standards except where more stringent requirements are indicated on the Drawings or specified herein.
 - 1. American Concrete Institute
 - a. ACI 318 Building Code Requirements for Reinforced Concrete.
 - b. ACI 506 Guide to Shotcrete.
 - c. ACI 506.3 Guide to Certification of Shotcrete Nozzlemen.
 - d. ACI 506.2 Specification for Materials, Proportioning and Application of Shotcrete.
 - 2. American Society for Testing and Materials
 - a. As specified herein.

1.5 Quality Control

- A. Perform all work in strict accordance with all applicable laws and regulations of the building code and with all other authorities having jurisdiction, except where the requirements of these Specifications are more exacting or stringent, they shall govern.
- B. The Contractor or Subcontractor shall have not less than two (2) years experience in the field of structural concrete restoration work and shotcrete repair work.
- C. A trial area shall be designated by the Engineer to demonstrate that the equipment, personnel, and methods of operation are capable of producing results satisfactory to the Engineer. The trial area shall consist of a minimum of 50 sf of adjacent soffit repair. Contractor shall not proceed until trial area is accepted by Engineer.
- D. Notify the Testing Laboratory of scheduled shotcreting dates. Notify the Testing Laboratory and the Engineer 48 hours in advance of shotcreting.
- E. Quality control sampling and testing shall be performed in accordance with ACI 506.2, Section 1.6.

1.6 Submittals

- A. Contractor shall submit for review and approval shotcrete mix design prior to shotcreting.
- B. Contractor to submit for record a written plan of action that includes, but is not limited to:
 - 1. Dust control and exhaust.
 - 2. Personnel communication during shotcreting.
 - 3. Protection of adjacent property, equipment, etc.
- C. Upon request, the Contractor shall submit a written description of construction ability including equipment, facilities, personnel, and a list of similar completed projects to the Engineer.

1.7 Transportation and Handling

- A. Store materials on platforms off ground, protect stored cement against elements. Handle and store aggregates separately in a manner to prevent intrusion of foreign material and to prevent segregation.
- B. Protect all materials until used. Any material which has deteriorated or which has been damaged shall not be used.

1.8 Basis of Payment

- A. All patching quantities shall be measured and paid on a square foot basis; estimated depth of patching is indicated on Drawings.
- B. Plan drawings shall be maintained locating all repairs performed under this Section. Location and size of patches must be located on clean drawings. Separate drawings shall be maintained

for each Level and Ceiling plan. These drawings shall be incorporated into record set required per Division 1.

PART 2 - PRODUCTS

2.1 Shotcrete Materials

- A. Portland Cement shall conform to ASTM standard specification for Portland Cement C150, Type I.
- B. Aggregates for shotcrete shall conform to ASTM standard specification for concrete aggregate, ASTM C33, exposure 5S.
 - 1. Gradation and limits for combined aggregate shall be as noted in Table 2.2.1 of ACI 506.2. Gradation No. 1 shall be used unless Contractor can demonstrate that reinforcement of the type and size to be encountered on the job can be properly encased using gradation No. 2.
- C. Water is to be clean and potable.
- D. Admixtures will not be permitted unless specifically approved by Engineer.

2.2 Shotcrete Properties

- A. Minimum compressive strength of the shotcrete shall be 5,000 psi at 28 days. Refer to Section 2.5 ACI 506.2 for additional information.

PART 3 - EXECUTION

3.1 Inspection

- A. Before commencing work, examine all adjoining work on which this work is dependent and report in writing to the Owner or Engineer any condition which prevents Contractor from performing the work. Starting work constitutes acceptance of adjoining work.
- B. Remove and replace or protect all electrical conduit, mechanical conductors, light fixtures, mechanical equipment, etc., necessary for the proper completion of repairs.
- C. Concrete patch preparation shall be performed in accordance with Section 02 4119, Selective Demolition and appropriate details as indicated on the Drawings.
- D. Existing reinforcement and miscellaneous metal to remain shall be cleaned of rust and laitance to Near White Metal and epoxy coated as required in Section 03 2000, Concrete Reinforcement.

- E. Following demolition, the condition of all reinforcing bars shall be inspected. If the bar's cross sectional loss is greater than 15%, the Contractor shall splice as directed by the Engineer. Minimal splice length shall be in accordance with ACI 318 and shall extend on either side of deterioration. Additional concrete removal may be required for placement of splice.

3.2 Shotcrete Equipment

- A. Dry-mix shotcrete equipment shall be used. Mixing water shall be introduced at the nozzle.
- B. Equipment shall be capable of handling 1/2" aggregate if gradation No. 2 is used (See Paragraph 2.1).

3.3 Placing Shotcrete Patch Material

- A. Contractor shall maintain separate plan drawings locating all concrete repairs performed under this section. Location and size of patches must be located on drawings
- B. Beam shotcrete repair formwork shall be required. Follow recommendation in ACI 506 for formwork as well as Section 03 1100, Concrete Formwork.
- C. Before placing shotcrete, formwork, if required, shall have been completed. Foreign materials shall have been removed, reinforcement shall have been secured in place and the entire preparation shall have been approved by the Engineer. Engineer shall be notified at least 48 hours prior to desired time of inspection.
- D. Immediately prior to the placing of concrete, the Contractor shall thoroughly clean the cavity of foreign matter. One hour prior to placing shotcrete, pre-wet bonding surface with a uniform spray application of water. Surface shall be maintained in a damp condition.
- E. Place shotcrete only when ambient temperature is 40 degrees and rising.
- F. Shotcrete shall be placed to provide a minimum of 1 inch cover on all embedded steel. Minimum requirements indicated on details of the Drawings shall be met as well.
- G. Shotcrete depth shall be at least equal to the depth of preparation, but shall not exceed the original concrete profile by greater than 1/2 inch.
- H. Contractor shall protect all adjacent surfaces. All debris shall be cleaned off adjacent surfaces following shotcrete operations.
- I. All overspray shall be removed from adjacent surfaces and patch cavities. The patch cavities shall be abrasive blasted to remove overspray prior to patching.
- J. Concrete surfaces shall be trowel finish.

3.4 Curing

- A. Curing shall be in accordance with ACI 506.2.
- B. Curing time shall be extended as Engineer directs, when the curing temperature falls below 50 degrees F.
- C. If shrinkage cracks appear in the shotcrete material prior to completion of initial 72 hour curing period, the shotcrete shall be considered defective and it shall be removed and replaced by the Contractor at no extra cost to the Owner.

END OF SECTION 03 3713

SECTION 04 0100 – MASONRY RESTORATION AND CLEANING

PART 1 - GENERAL

1.1 Related Documents

- A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

1.2 Work Included

- A. The Work of this Section shall include providing all labor, materials, equipment, and supervision to rebuild and to clean, repair, and repoint the masonry walls as indicated on the Drawings.

1.3 Related Work

- A. The following Work is related to this Section:
 - 1. Joint Sealants Section 07 9200

1.4 Reference Standards

- A. Comply with the following reference standards except where more stringent requirements are shown on the Drawings or specified:
 - 1. Brick Industry Association (BIA) "Technical Notes on Brick Construction"
 - 2. ACI 530/530.1-13 "Building Code Requirements and Specification for Masonry Structures"

1.5 Quality Control

- A. All masonry work shall be performed by a mason experienced in the class of required work. Workmanship shall be of the highest quality.

1.6 Submittals

- A. Submit for record Manufacturer's Spec Data Sheets and Safety Data Sheets for each product indicated including recommendations for their application and use. Include test reports and certifications substantiating that products comply with local, state, and federal environmental and worker's safety laws and regulations.

- B. Submit for record written program of procedures to be used in complying with this specification, including written description of cleaning methods, working pressures, materials and equipment proposed.
- C. Submit for record disposal plan including location of acceptable disposal site; and detailed description of methods to be employed to control pollution.

1.7 Samples

- A. Submit upon request for review and approval, samples of masonry units.

1.8 Transportation and Handling

- A. Store masonry units on wood skids or pallets. Distribute weight of masonry units evenly to prevent breakage or cracking. Protect stored masonry units from weather with waterproof, non-staining covers or enclosures, but allowing for circulation of air.
- B. Protect mortar materials and masonry accessories from weather, moisture and contamination with earth and other foreign materials.

PART 2 - MATERIALS

2.1 Masonry

- A. Reuse existing masonry units which have been removed from the walls due to construction operations.
- B. Whenever masonry units are not sufficient, either in supply or quality, Contractor shall furnish new masonry units matching existing.

2.2 Mortar and Grout

- A. Mortar for masonry units, ASTM C270, non-staining and non-air entrained.
- B. Material shall match existing color of mortar and grout. Color to be modified in accordance with manufacturer's recommendation.

2.3 Ties

- A. Acceptable materials are:
 - 1. At concrete back-up, Dur-O-Wall Repair Anchor #5005554. At CMU back-up, Dur-O-Wall Repair Anchor #5005554.

2. AA900 Retro Tie by AA Wire Products Company.
3. or Approved Equivalent.

2.4 Cleaning Materials

- A. Cleaning compounds shall not contain acids, nor cause scratching of surface, or staining.

PART 3 - EXECUTION

3.1 Inspection

- A. Inspect area to receive the work and report immediately in writing to the Engineer, as required in the General Conditions, any unacceptable conditions. Do not proceed with work until unsatisfactory conditions have been corrected in an acceptable manner. Commencement of work implies acceptance of related work.

3.2 Preparation

- A. Protect persons, motor vehicles, surrounding surfaces of building whose masonry surfaces are being restored, building site and surrounding buildings from injury resulting from masonry restoration work.
- B. Erect additional temporary protection as required over pedestrian walkways and at points of entrance and exit for persons and vehicles which must remain in operation during course of masonry restoration work. Refer to Section 01 5600, Temporary Barriers and Enclosures.
- C. Remove temporarily, if required, or protect signage, electrical fixtures, electrical outlets, etc. from wall surfaces. Reinstall removed items at completion of construction.
- D. Remove all loose and unsound mortar and loose masonry units from existing walls.
- E. Clean existing masonry wall surfaces and mortar joints free of dust, dirt or other foreign materials prior to installation of new masonry.

3.3 Masonry Replacement

- A. Use care to remove damaged masonry units.
- B. Do not remove existing masonry in quantities that could potentially weaken the structural integrity of the wall. Install shoring whenever masonry removal exceeds 36 inches. For sections exceeding 5 feet continuous contractor shall provide submittal/written procedure indicating his proposed stabilization method and sequence.

- C. Any damage caused to masonry sections or areas not scheduled for removal and replacement by the Contractor's failure to properly stabilize undisturbed sections shall be repaired at no additional cost to the owner.
- D. Remove masonry units by sawcutting through the mortar in the joints surrounding the masonry units in question.
 - 1. Masonry shall be removed in a sawtooth pattern.
 - 2. All existing mortar on adjacent masonry units that are to remain in place shall be removed and the surfaces prepared for placement of new mortar and masonry units.
 - 3. Care should be taken not to damage surrounding masonry, windows, etc. Any damage to surrounding materials will be repaired by the Contractor at no cost to the Owner.
 - 4. Weather protection shall be installed to protect the open cavity from water damage when removal cavity is left open over night or when it may rain.
- E. Handle masonry units in a manner to prevent chipping, breakage, soiling or other damage. Do not use pinch or wrecking bars without protecting edges of masonry with wood or other rigid materials.
- F. Where possible, use full-size units without cutting.
- G. Install ties at 16 inches maximum on center each way.
- H. Cut all masonry units, as required, to provide accurate fit and to maintain plane of existing masonry. Cut masonry units with motor-driven saws to provide clean, sharp, un-chipped edges.
 - 1. Cut units as required to provide a continuous pattern and to fit adjoining construction.
 - 2. Install cut units with cut surfaces and, where possible, cut edges concealed.
- I. Pre-wet all masonry prior to placement to prevent improper cure of the mortar.
- J. Install replacement masonry plumb, level, and true to line and all corners. Verify all angles are square. Use block lines whenever possible. If use of a line pin is required, rake out the hole within the mortar joint and repoint with mortar during subsequent work.
- K. Provide uniform distribution of size and shape of masonry units to match existing.
- L. Match existing patterns, bonds, and/or special details accurately.
- M. Set all masonry in full bed of mortar. Do not set additional courses of masonry until mortar in courses below is set sufficiently to maintain alignment and prevent extrusion.
- N. Completely fill all head joints of replacement masonry with mortar.

- O. Tool mortar joints to match profile of existing mortar joints, unless otherwise indicated, when thumbprint-hard. Remove excess mortar from edge of joint by brushing.
- P. Allow mortar droppings on masonry units to dry, remove with trowel followed by bristled brush.

3.4 Repointing Existing Masonry

- A. Remove deteriorated mortar in masonry joints back to a uniform depth of $\frac{3}{4}$ inch, or until sound, unweathered mortar is reached. Remove mortar the entire width of the joint.
- B. Cut back existing mortar joints to form right angles, square, at terminations with toothing chisel or pointer's grinder to expose masonry for contact with pointing mortar.
- C. Do not damage masonry units during removal of mortar.
- D. Brush, vacuum, or flush joints to remove dirt and loose debris.
- E. Pre-hydrate repointing mortar to reduce excessive shrinkage.
 - 1. Thoroughly mix all dry ingredients.
 - 2. Add only enough water to the dry mix to produce a damp, workable consistency that will retain its shape when formed into a ball.
 - 3. Allow repointing mortar to stand in dampened condition for approximately 1 hour.
- F. Add additional water to pre-hydrated mortar to maintain workable consistency.
- G. Wet mortar joints to a saturated, surface dry condition prior to installation of new mortar.
- H. Pack repointing mortar into joints in layers not greater than $\frac{1}{4}$ inch until a uniform depth is formed. Compact each layer thoroughly and allow it to become thumbprint-hard before applying next layer.
- I. Tool joints to match profile of existing mortar joints, unless otherwise indicated, when thumbprint-hard. Remove excess mortar from edge of joint by brushing.
- J. Cure mortar by maintaining in a damp condition for not less than 72 hours.

3.5 Environmental Requirements

- A. Cold/Hot Weather Procedures: Comply with ACI 530/530.1-13 and the following.
- B. Cold Weather Procedure:

1. Do not install masonry when the air temperature is below 45 deg. F, unless it is rising, and at no time when the air temperature is below 40 deg. F, except with written permission of the Engineer/Architect.
2. When the air temperature is between 40 deg. F and 32 deg. F, and masonry installation is authorized, heat mortar sand or mixing water at time of mixing to produce mortar temperatures between 70 deg. F and 120 deg. F.
3. Do not lay masonry units which have a surface temperature of 20 deg. F or less.
4. Maintain air temperature above 40 deg. F on both sides of masonry for at least 72 hours after installation.

C. Hot Weather Procedure:

1. Protect masonry installation from direct exposure to sun and wind when the air temperature is 95 deg. F or greater in the shade with a relative humidity less than 50 percent.
2. Maintain temperature of mortar and grout below 120 deg. F.
3. Retemper with cool water to maintain mortar consistency.
4. Use mortar within 2 hours of initial mixing.

3.6 Protection

- A. During all seasons, protect partially completed masonry repairs against weather when work is not in progress. Cover top of walls with strong waterproof, non-staining membrane extending at least 2 feet down both sides of walls and anchor securely in place.

3.7 Masonry Cleaning

- A. Perform masonry repairs, including but not limited to replacement and/or repointing, before cleaning.
- B. Allow all mortar and sealant to thoroughly cure before cleaning.
- C. Clean all masonry of stains, mortar, dirt, efflorescence, organic growth, etc. Use least aggressive method necessary to remove deposits and growth:
1. Begin cleaning operations by dry brushing with a stiff fiber bristle brush.
 2. Clean exposed surfaces by low-pressure water blasting, maximum 400 pounds per square inch pressure at the nozzle. Use a rotating nozzle or a device for aerating the water stream to reduce the force. Supplement the water blasting with fiber bristle brushing.

3. If required, supplement the low-pressure water blasting and scrubbing with approved cleaning solutions.
- D. Tools and cleaning material used shall not cause scratching of surface or staining. Cleaning compounds used shall not damage plantings.
- E. Protect all surrounding surfaces. Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings and other surfaces which could be injured by such contact.
- F. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
- G. Dispose of run-off from cleaning operations by legal means and in a manner which prevent soil erosion, undermining of paving foundations, damage to landscaping, and water penetration into building interiors.

3.8 Clean-up

- A. Protect finished work from stains.
- B. Protect storage, construction and mixing areas, as well as surrounding surfaces and leave them clean. Clean all stains or dirt on surrounding surfaces resulting from the implemented repairs to the satisfaction of the Owner at no additional cost.
- C. Remove and replace all damaged materials to the satisfaction of the Owner at no additional cost.

END OF SECTION 04 0100

SECTION 042200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Decorative concrete masonry units.
3. Steel reinforcing bars.

B. Structural Drawings include additional cast-in-place concrete specifications and testing requirements. Wherever conflicts or ambiguities occur between the provisions in the construction documents and the provisions in the specifications, the Structural Engineer and Architect shall be the sole arbiters of which provision shall apply.

1. The Structural Drawings include additional cast-in-place concrete specifications and testing requirements. Wherever conflicts or ambiguities occur between the provisions in the construction documents and the provisions in the specifications, the Structural Engineer and Architect shall be the sole arbiters of which provision shall apply.

C. Related Requirements:

1. Section 030130, "Concrete Repair" for concrete repair work associated with masonry work.
2. Section 031100, "Concrete Formwork", for masonry work associated with concrete formwork.
3. Section 05 12 00 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
4. Section 07 19 00 "Water Repellents" for water repellents applied to unit masonry assemblies.
5. Section 07 21 00 "Thermal Insulation" for cavity wall insulation.

1.2 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of product. For masonry units, include data on material properties material test reports substantiating compliance with requirements.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
 - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.5 FIELD CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 2. Provide bullnose units for outside corners unless otherwise indicated.
- B. Insulated CMUs: Where indicated, units shall contain rigid, specially shaped, cellular thermal insulation units complying with ASTM C 578, Type I, designed for installing in cores of masonry units.
1. Location: Stairwells and full height of masonry walls on the North Stair from the ground floor to the underside of the roof.
- C. CMUs: ASTM C 90.
1. Density Classification: Normal weight.
 2. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less than nominal dimensions.
- D. Decorative CMUs: ASTM C 90.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Grand Blanc Cement Products.
 - 1) Color: Trevor.
 - b. Approved equal prior to bid date.
 2. Density Classification: Normal weight.
 3. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph.
 4. Pattern and Texture:
 - a. Standard pattern, ground-face finish.
 5. Provide bullnose corners on exposed ends and outside corners.
 6. Burnish each face and ends where exposed.

2.3 CONCRETE LINTELS

- A. Concrete Lintels: ASTM C 1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated.[Provide lintels with net-area compressive strength not less than that of CMUs.]

2.4 MORTAR AND GROUT MATERIALS

- A. Refer to Structural Drawings.

2.5 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from

0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

C. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.

1. Interior Refer to Structural Drawings.

2.6 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Refer to Structural Drawings.

2.7 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim" and as follows:

1. Fabricate metal drip edges from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees[and hemmed].
2. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.
3. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.

B. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Copper-Laminated Flashing: 7-oz./sq. ft. (2-kg/sq. m) copper sheet bonded between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
 - a. Refer to Structural Drawings.
2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch (1.02 mm).
 - a. Interior Refer to Structural Drawings.
3. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.040 inch (1.02 mm).
 - a. Refer to Structural Drawings.
4. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.

- a. Refer to Structural Drawings.
- 5. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637/D 4637M, 0.040 inch (1.0 mm) thick.
 - a. Refer to Structural Drawings.
- C. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar.
- D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."
- E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.9 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use [portland cement-lime] [or] [masonry cement] mortar unless otherwise indicated.
 - 3. For exterior masonry, use [portland cement-lime] [or] [masonry cement] mortar.
 - 4. For reinforced masonry, use [portland cement-lime] [or] [masonry cement] mortar.
 - 5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270. Provide the following types of mortar for applications stated unless another type is indicated.
 - 1. For masonry below grade or in contact with earth, Interior Refer to Structural Drawings.
 - 2. For reinforced masonry, Refer to Structural Drawings.
 - 3. For mortar parge coats, Refer to Structural Drawings.
 - 4. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
 - 5. For interior nonload-bearing partitions, Type O may be used instead of Type N.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 - 2. Proportion grout in accordance with ASTM C 476, Table 1, or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi (14 MPa).
 - 3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.

2.10 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
 - 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. MasonPro's Surekleen 600.
 - b. Approved Equal.

2.11 MASONRY SEALERS

- A. After cleaning apply one coat of masonry sealer in the field, as recommended by the manufacturer.

2.12 MASONRY INSULATION

- A. Core-fil 500 foam, fill all cavities that aren't grouted solid.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- E. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- F. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
 - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
 - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
 - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
- B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).

1. Space reinforcement not more than 16 inches (406 mm) o.c.
 2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
 3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings[in addition to continuous reinforcement].
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.

3.6 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
1. Provide an open space not less than 1 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.7 FLASHING

- A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.
- B. Install flashing as follows unless otherwise indicated:
1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 2. At lintels, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
 3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
 4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.

- C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

3.8 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 60 inches.

3.9 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to Structural Drawings.

3.10 PARGING

- A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4 inch (19 mm). Dampen wall before applying first coat, and scarify first coat to ensure full bond to subsequent coat.
- B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot (3 mm per 300 mm). Form a wash at top of parging and a cove at bottom.
- C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.11 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
 - 2. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.12 MASONRY WASTE DISPOSAL

- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

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END OF SECTION 042200

SECTION 05 2100 – STEEL JOISTS

PART 1 - GENERAL

1.1 Related Documents

- A. Conditions of Contract for Construction and General Requirements of Division 1 of these specifications apply to Work in this section.

1.2 Work Included

- A. Work of this Section shall include, providing all labor, materials, accessories, equipment, and supervision necessary to complete installation of steel joists as indicated on Drawings and as specified herein.
- B. Delegated Design: Contractor shall employ an engineer registered in the State of Michigan to design steel joist and roof framing system.

1.3 Related Work

- A. Following Work is related to this Section:

- | | |
|-------------------------|-----------------|
| 1. Masonry | Division 4 |
| 2. Steel Decking | Section 05 3100 |
| 3. Miscellaneous Metals | Section 05 5700 |

1.4 Reference Standards

- A. Comply with provisions of latest editions of following codes, except where more stringent requirements are indicated on Drawings or specified herein:
 - 1. Steel Joist Institute
 - a. (SJI) Standard Specifications, Load Tables and Weight Tables.
 - 2. American Welding Society
 - a. AWS D1.1, Structural Welding Code-Steel.
 - 3. Steel Structures Painting Council (SSPC).
 - a. Steel Structures Painting Manual

4. American Society for Testing and Materials (ASTM)
 - a. As specified herein.

1.5 Quality Assurance

- A. Any bidder who is not a current member in good standing of SJI and AISC shall submit to Engineer, engineering calculations covering design of joists and mill reports for steel used in joists furnished for this project. Design calculations must bear seal and signature of a Professional Engineer registered in State of Project.
- B. Load tests may be requested by Engineer.

1.6 Submittals

- A. For record, Manufacturer's specifications and installation instructions for each type of joist and accessory, include an affidavit from steel joist Manufacturer, signed and sealed by a Registered Professional Engineer in State in which project is located attesting that each type and size of joist supplied complies with SJI Standard Specifications and Load Tables. Such affidavit shall not relieve responsibility of complying with any added requirements specified herein.
- B. For review and approval detailed shop drawings indicating following:
 1. Joist type
 2. Material properties
 3. Number
 4. Sizes
 5. Location and elevations
 6. Spacing
 7. Bridging
 8. Connections
 9. Headers
 10. Anchoring
 11. Bearing Plates
 12. All details of erection
- C. For record AWS certification of each welder prior to commencing Work.
- D. For record paint Manufacturer's technical data covering each product giving percentage of volume solids, shelf life, curing time, recommended dry film thickness, mixing, thinning and application instructions.

1.7 Transportation and Handling

- A. Deliver joists to site bundled and tagged and in good condition.

- B. Store joists upright, off ground.
- C. Replace damaged joists at no additional cost to Owners.

PART 2 - PRODUCTS

2.1 Joists

- A. Joists shall be series as indicated on Drawings with an allowable maximum working stress of 30,000 psi and a minimum yield strength of 50,000 psi.

2.2 Accessories

- A. Extended ends on joists where indicated on Drawings, complying with Manufacturer's standards and requirements of SJI Specifications and Load Tables.
- B. Horizontal or diagonal type bridging, complying with SJI Specifications.
- C. End anchorages to secure joists to adjacent construction.
- D. Header units to support tail joists at openings if floor or roof system is not framed with steel shapes.
- E. Anchor bolts and other devices to be built into concrete, steel, and masonry construction to be installed by Others.
- F. High-strength threaded fasteners, ASTM A325 size as indicated on Drawings.

2.3 Painting

- A. Before joists, bridging anchors and other accessories are painted, clean steel to remove all oil, grease, loose mill scale, and other foreign materials. Use hand tool or power tool cleaning methods in accordance with SSPC-SP2 or SSPC-SP3.
- B. Joists shall be shop primed with red oxide paint conforming to Federal Specification TT-P-636 or Steel Structure Paint Council Specification 15-68T, Type 1. Acceptable primers include joist Manufacturer's standard. Primer shall be applied in strict compliance with Manufacturer's specifications and recommendations.
- C. Do not paint joists when steel temperature is below dew point of atmosphere.
- D. Refer to Section 09 9100, Painting, for final coating system if required.

PART 3 - EXECUTION

3.1 Inspection

- A. Examine areas and conditions under which steel joists are to be installed and notify Engineer in writing, as required in General Conditions, of conditions detrimental to proper and timely completion of Work. Do not proceed with Work until unsatisfactory conditions have been corrected in an acceptable manner. Commencement of joist erection implies acceptance of related Work performed by others.

3.2 Fabrication

- A. Fabricate steel joists in accordance with SJI Specifications.

3.3 Erection

- A. Set joists accurately in place for spacing as indicated on shop drawings. Provide proper length of bearing at each end. Joists shall have full contact between bearing surfaces.
- B. Field weld joists to supporting steel framework in accordance with SJI Specifications for the type of joists used. Coordinate welding sequence and procedure with placing of joists. Field bolt joists at columns.
- C. As soon as joists are erected, before any construction loads are applied, bridging shall be installed and permanently fastened into place. Anchor ends of bridging lines to walls or beams. Provide temporary bridging, connections, and anchors as necessary to ensure lateral stability during construction.
- D. Care shall be exercised to avoid excessive concentrated loads. Contractor shall provide means for adequate distribution of such loads so that capacity of joists are not exceeded.

3.4 Cleanup

- A. Clean and touchup paint all field bolt heads and nuts, field welds and abraded areas. Paint all exposed areas with same primer as used for shop painting.

END OF SECTION 05 2100

SECTION 05 3100 – STEEL DECKING

PART 1 - GENERAL

1.1 Related Documents

- A. Conditions of Contract for Construction and General Requirements of Division 1 of these specifications apply to Work in this Section.

1.2 Work Included

- A. Work of this Section shall include providing all labor, materials, equipment, and supervision necessary to complete installation of roof deck systems including accessories as indicated on Drawings and specified herein.
- B. Delegated Design: Contractor shall employ an engineer registered in the State of Michigan to design steel decking and roof framing system.
- C. All metal roof deck and/or composite metal deck shall be manufactured and installed in accordance with recommendations and specifications of Steel Deck Institute.

1.3 Related Work

- A. Following Work is related to this Section:

- | | |
|------------------------------------|-----------------|
| 1. Miscellaneous Metals | Section 05 5700 |
| 2. Steel Joists | Section 05 2100 |
| 3. Thermal and Moisture Protection | Division 7 |

1.4 Design

- A. Roof deck to resist gross wind uplift pressure. Dead load may be deducted from uplift forces.
- B. Roof deck maximum deflection of 1/240 of center-to-center span under uniformly distributed live load indicated on Drawings or 200 lbs concentrated load at mid-span on a 1'-0" wide section.
- C. Composite floor deck maximum deflection of 1/360 of center-to-center span under uniformly distributed live load as indicated on Drawings. Deck shall have rolled-in embossments/shear lugs capable of developing composite action between concrete and metal deck.
- D. Provide fire resistance ratings for deck assemblies as listed in UL "Fire Resistive Directory," bearing UL label.

- E. Deck section properties shall be in accordance with AISI, "Specification for the Design of Cold-Formed Steel Structural Members." Maximum working stress shall not exceed 20,000 psi.

1.5 Reference Standards

- A. Comply with following requirements of current specifications for standards listed, except where more stringent requirements are indicated on Drawings or specified herein:
 - 1. American Iron and Steel Institute
 - a. AISI, "Specifications for the Design of Cold-Formed Steel Structural Members."
 - 2. American Welding Society
 - a. AWS D1.3 "Structural Welding Code - Sheet Steel."
 - 3. Steel Deck Institute
 - a. SDI, "Design Manual for Composite Decks, Form Decks, Roof Decks and Cellular Metal Floor Decks with Electrical Distribution".
 - b. SDI, Manual of Construction with Steel Deck.
 - 4. American Society for Testing and Materials (ASTM).
 - a. As specified herein

1.6 Quality Control

- A. Manufacturer to be member of Steel Deck Institute.
- B. Use welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."

1.7 Submittals

- A. For review and approval detailed shop drawings indicating all information necessary for fabrication and installation of deck systems, including but not limited to:
 - 1. Layout
 - 2. Types of deck units, gauge and finish
 - 3. Anchorage details including welded connections using standard AWS welding symbols
 - 4. Supplementary framing
 - 5. Roof deck accessories including sump pans, cant strips, etc.
 - 6. Floor deck accessories including cell closures, "Z" closures, column closures, pour stops, etc.
 - 7. Openings

8. Special jointing
 9. U.L. fire resistance rating
- B. For review and approval Manufacturer's specifications and installation instructions for each product specified.
 - C. For review and approval, certification that all materials are in accordance with Steel Deck Institute.
 - D. For review and approval certification that each welder has satisfactorily passed A.W.S. qualification tests for welding processes and that qualifications are current.

1.8 Transportation and Handling

- A. All deck must be protected by tarpaulins or other protective coverings while in transit from fabrication point to project site. Deck which arrives uncovered will not be accepted. Protect from corrosion, deformation or any other damage during delivery, storage or handling.
- B. Keep deck covered while in storage before erection. Assure that covered bundles have adequate air movement beneath covering to preclude condensation.
- C. Provide sufficient hardwood blocking beneath stored bundles to maintain positive slope towards one end to allow proper drainage of rain water from covering. Stack in a manner that removes danger of tipping or shifting.

PART 2 - PRODUCTS

2.1 Materials

- A. Galvanized Roof Deck:
 1. Deck: ASTM A 653, Grade 33 or higher with ASTM A 924, G60 zinc-coating. Type depth and gauge as indicated on Drawings.
 2. Accessories: ASTM A 924, G60 zinc-coating.
 3. Galvanizing Repair Paint: MIL-P-21-35 (Ships).
 4. Approved Deck Manufacturers are:
 - a. Inryco
 - b. Rollform
 - c. Vulcraft
 - d. or Approved Equivalent

PART 3 - EXECUTION

3.1 Inspection

- A. Inspect area to receive Work and report immediately in writing to Engineer, as required in General Conditions, any unacceptable conditions. Do not proceed with Work until unsatisfactory conditions have been corrected in an acceptable manner. Commencement of metal deck installation implies acceptance of related Work.

3.2 Fabrication

- A. Form deck units in lengths to span at least 4 supports except where framing layout does not permit; flush, telescoped, or nested 2 inch end laps; nested or interlocked side laps. Single and double spans, if required, shall satisfy load and deflection requirements. Refer to Drawings for additional requirements.
- B. Provide cover plates, roof sump pans, pour stops, column closures, end closures, cover plates and fillers as required by the Steel Deck Institution as indicated on Drawings; use deck Manufacturer's standards.
- C. Fabricate accessories including metal closure strips for openings between deck and other construction of not less than 18 gage sheet steel of same quality as deck units. Form to configuration required to provide tight-fitting closures at open ends of flutes and sides of deck units.

3.3 Installation

- A. Place accessory units in accordance with Manufacturer's recommendations.
- B. Cut and fit deck units and accessories around other Work projecting through and adjacent to deck units as indicated on Drawings. Provide neat, square and trim cuts.
- C. Provide additional metal reinforcement and closures as required for strength, continuity of steel roof deck and support of other Work as indicated on Drawings.
- D. Reinforce deck around openings 6 inches to 12 inches in size by means of a flat galvanized steel sheet placed over the openings on top of deck units and fusion welded to surface of deck units. Provide not less than 18 gage steel sheet of same quality as deck units, at least 12 inches wider and longer than opening, unless otherwise noted on Drawings. Space welds at each corner and not more than 12 inches on center along each side.
- E. Deck shall be welded at 18 inches on at all interior supports and 12 inches on center at all exterior supports with a 5/8 inch diameter puddle weld. Provide a minimum of one side lap connection per span unless noted otherwise on Drawings, or minimum side lap connections required by the Steel Deck Institute. Self-tapping screws may be used with approval of Engineer.
- F. End laps shall be a nominal 2 inches positioned over supports.
- G. Coat all welds and abraded areas with zinc rich galvanizing prime paint.

- H. Do not suspend from metal decks.

3.4 Cleanup

- A. Clean field welds and abraded areas, and apply galvanizing repair paint on damaged galvanized surfaces.

END OF SECTION 05 3100

SECTION 05 5213 – PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 Related Documents

- A. Conditions of Contract for Construction and General Requirements of Division 1 of these Specifications apply to Work in this Section.

1.2 Work Included

- A. Work of this Section shall include providing all labor, materials, accessories, equipment, and supervision to complete installation of guardrails as indicated on Drawings and as specified herein.
 - 1. Steel guardrails (hot-dip galvanized)

1.3 Related Work

- A. Following Work is related to this Section:
 - 1. Miscellaneous Metals Section 05 5700

1.4 Design

- A. Railing shall be installed to comply with the requirements listed in the current edition of the Michigan Building Code.
- B. Railing assembly, and attachments to resist loadings required by ASCE Standard 7 Minimum Design Loads for Buildings and Other Structures.
- C. Control of corrosion: prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

1.5 Reference Standards

- A. Comply with provisions of following codes and standards, latest editions, except where more stringent requirements are indicated on Drawings or specified herein:
 - 1. The National Association of Architectural Metal Manufacturers.
 - a. Metal Stairs Manual

2. Steel Structures Painting Council (SSPC) Manual
 - a. Steel Structures Painting Manual
3. American Society of Testing and Materials (ASTM)
 - a. As specified herein.
4. American Institute Steel Construction
 - a. AISC Manual of Steel Construction, including Specification for Structural Steel Buildings.
5. American Welding Society
 - a. AWS D 1.1 Structural Welding Code - Steel.
 - b. AWS D 1.3 Structural Welding Code - Sheet Steel.
 - c. AWS D 1.6 Structural Welding Code - Stainless Steel.
6. Steel Structures Painting Council (SSPC)
 - a. Steel Structures Painting Council Manual, Volume I, Good Painting Practices
 - b. Steel Structures Painting Council Manual, Volume II, Systems and Specifications

1.6 Quality Control

- A. Use welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."

1.7 Submittals

- A. For review and approval shop drawings indicating all information necessary for fabrication and erection of handrails, including:
 1. Plan location
 2. Material
 3. Elevation details
 4. Sizes
 5. Connection attachments
 6. Anchorage
 7. Size and type of fasteners
 8. Accessories
- B. For review and approval written certification that systems have been designed and installed to meet or exceed required loadings.
- C. For review and approval templates for anchors and bolts specified for installation under other sections.
- D. For review and approval certification of each welder. A requalification test will be necessary if welder is not engaged in a given process for a period exceeding six months.

1.8 Transportation and Handling

- A. Deliver all metals to Project site and handle and store in such a manner as not to damage or distort material.
- B. Handle so as not to damage coating system.
- C. Replace damaged material at no additional expense to Owner.

1.9 Basis of Payment

- A. Fabrication and installation of steel guardrail system will be paid on a unit cost or lump sum basis. Refer to Bid Form.

PART 2 - PRODUCTS

2.1 Steel Guardrail System

- A. Pipe: Structural pipe schedule 40, ASTM A53 Grade B.
- B. Rails and Posts: Size as indicated on Drawings; welded joints.
- C. Exposed Fasteners: Flush counter-sunk screws or bolts; consistent with railing design.
- D. Splice Connectors: Steel concealed spigots.

2.2 Manufacturers

- A. Approved meeting Specifications.

2.3 Galvanizing

- A. Provide a zinc coating for those items as indicated on Drawings herein or specified to be galvanized; comply with following:
 - 1. Iron and Steel Hardware: ASTM A 153.
 - 2. Rolled, pressed and forged steel shapes, plates, bars and strip 1/8 inch thick and heavier: ASTM A 123. (1.25 oz./sq. ft. min.)
 - 3. Assembled Steel Products: ASTM A 386. (1.25 oz./sq. ft. min.)

PART 3 - EXECUTION

3.1 Inspection

- A. Inspect area to receive Work and report immediately in writing to Engineer, as required in General Conditions, any unacceptable conditions. Do not proceed with Work until unsatisfactory conditions have been corrected in an acceptable manner. Commencement of handrail erection implies acceptance of related Work.
- B. Take field measurements prior to preparation of Shop Drawings and fabrication.

3.2 Fabrication

- A. Fit and shop assemble components in largest practical sizes, for delivery to site.
- B. Fabricate components with joints tightly fitted and secured.
- C. Fabricate anchors and related components of same material, except where specifically noted otherwise on Drawings.
- D. Continuously seal joined pieces by continuous welds.
- E. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

3.3 Preparation

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Verify that field measurements are as indicated on shop drawings.

3.4 Installation

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Field weld anchors as indicated on shop drawings. Grind welds smooth.
- C. Conceal bolts and screws whenever possible. Where not concealed, use flush counter-sunk fastenings.

3.5 Erection Tolerances

- A. Maximum variation from plumb: 1/4 inch.

- B. Maximum offset from true alignment: 1/4 inch.

3.6 Repairs and Protection

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.
 - 1. Galvanizing repair areas include but are not limited to:
 - a. Field welded connections
 - b. Damaged galvanized coatings for pieces not rejected per ASTM A 123/A 123M.
 - 2. Zinc Spray (Metallizing) – AWS C2.2
 - a. Surface Preparation: SSPC-SP 10, "Near White Metal."
 - b. Coating thickness shall equal or exceed hot dip thickness requirements per ASTM A 123/A 123M.
 - c. Apply clear top coat.
 - 3. Zinc-Rich Paint
 - a. Surface Preparation: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Coating thickness: Minimum of 6 mils (dry film) to be applied in multiple coats per manufacturer's instructions
 - c. Acceptable materials are:
 - 1) ZRC Cold Galvanizing Compound, Z.R.C. Worldwide, Marshfield, Massachusetts
 - 2) ZRC Galviline, Z.R.C. Worldwide, Marshfield, Massachusetts
 - 3) or Approved Equal
 - d. Prepare trial areas with ZRC Galvalite and ZRC Cold Galvanizing Compound for Owner review and material selection.

3.7 Cleanup

- A. Remove all dirt, tags, and foreign materials from railings.

END OF SECTION 05 5213

SECTION 05 5700 – MISCELLANEOUS METALS

PART 1 - GENERAL

1.1 Related Documents

- A. Conditions of Contract for Construction and General Requirements of Division 1 of these Specifications apply to Work in this Section.

1.2 Work Included

- A. Work of this Section shall include all labor, materials, equipment, and supervision necessary to complete installation of miscellaneous metals as indicated on Drawings and listed below:
 - 1. Lintels
 - 2. Steel Pipe Bollards
 - 3. Guardrails
 - 4. Metal Ladders
 - 5. Slotted Channel Framing for mechanical unit support

1.3 Related Work

- A. Following Work is related to this Section:

1. Cast-in-Place Concrete	Section 03 3000
2. Masonry	Division 4
3. Steel Joists	Section 05 2100
4. Steel Decking	Section 05 3100
5. Pipe and Tube Railings	Section 05 5213

1.4 Design

- A. Design of miscellaneous metals in accordance with American Institute of Steel Construction's (AISC) Manual of Steel Construction, including Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
- B. Details indicated on Drawings are in general conceptual only and do not indicate required number of bolts or weld sizes unless specifically noted. Submit complete details of bolting or welding procedures to be used before commencing fabrication or erection. Where primary stresses, shrinkage stresses or distortion could affect adequacy of structure, submit welding sequence to prevent distortion.
- C. Fabricator shall be responsible for design of connections to carry service loads, moments, and shears as indicated on Drawings. Connection design shall be by a qualified Professional

Engineer registered in state in which project is located. Detailing shall be performed using rational engineering design and standard practice in accordance with Contract Documents.

- D. Connections, unless otherwise indicated on Drawings, shall be simple shear connections utilizing high-strength bolts and bearing type connections with threads excluded from shear plane.
- E. All connections shall be bolted or welded, and shall develop a minimum of 50% of allowable uniform load tabulated in AISC "Manual of Steel Construction." All connections shall have a minimum of two (2) bolts or ¼" thick fillet weld.

1.5 Reference Standards

- A. Comply with provisions of following codes and standards, latest editions except where more stringent requirements are indicated on Drawings or Specifications.
 - 1. American Institute Steel Construction
 - a. AISC Manual of Steel Construction, including Specification for Structural Steel Buildings.
 - 2. American Iron and Steel Institute
 - a. AISI Specifications for the Design of Cold-Formed Steel Structural Members.
 - 3. American Welding Society
 - a. AWS D 1.1 Structural Welding Code - Steel.
 - b. AWS D 1.3 Structural Welding Code - Sheet Steel.
 - c. AWS D 1.6 Structural Welding Code - Stainless Steel.
 - 4. Steel Structures Painting Council (SSPC)
 - a. Steel Structures Painting Council Manual, Volume I, Good Painting Practices
 - b. Steel Structures Painting Council Manual, Volume II, Systems and Specifications
 - 5. American Concrete Institute.
 - a. ACI 301, Standard Specification for Structural Concrete.
 - 6. American Society Testing Materials
 - a. As specified herein.
 - 7. The National Association of Architectural Metal Manufacturers.
 - a. Metal Stairs Manual

1.6 Quality Control

- A. Use welders with current AWS certifications for required welding Work.
- B. Source Quality Control
 - 1. Testing Agency: Contractor to engage a qualified testing agency to perform shop tests and inspections.
 - a. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

2. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
3. Inspect and test galvanized coatings.
 - a. Visual inspection.
 - b. Coating thickness testing per ASTM E376.
 - c. Adherence testing per ASTM A 123/A 123M.
4. Prepare test and inspection reports.
5. The Owner may engage an independent testing agency to perform Source Quality Assurance reviews in addition to Source Quality Control inspections.
 - a. Provide testing agency with access to places where miscellaneous metal work is being fabricated or produced to perform tests and inspections.

C. Field Quality Control

1. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections
 - a. Verify structural-steel materials and inspect steel frame joint details.
 - b. Verify weld material and inspect welds.
2. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
3. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
 - a. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1) Liquid Penetrant Inspection: ASTM E165
 - 2) Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3) Ultrasonic Inspection: ASTM E 164.
 - 4) Radiographic Inspection: ASTM E94.
4. Inspect galvanized coatings.
 - a. Visual inspection of galvanized coatings
 - b. Inspection of surface preparation for areas to receive galvanizing repair.
 - c. Coating thickness testing per ASTM E376 of galvanized coating and galvanizing repair.
5. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

1.7 Submittals

- A. For review and approval show drawings of Guardrail design sealed by a Professional Engineer, registered in the State where the project is located.
 - 1. Show fabrication and installation details.
 - 2. Include plans, elevations, sections, and details of Guardrail, and their connections.
 - 3. Show anchorage and accessory items.
 - 4. Provide templates for anchors and bolts specified for installation under other sections.
- B. Submit calculations sealed by a Professional Engineer, registered in the State in which the project is located.
- C. For review and approval AWS welder certification.

1.8 Field Conditions

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.9 Transportation and Handling

- A. Deliver all miscellaneous metals to Project site and handle and store in such a manner as not to damage or distort material.
- B. Handle so as not to damage coating system.
- C. Replace damaged material at no additional expense to Owner.

1.10 Basis of Payment

- A. Fabrication and installation of steel pipe bollard will be paid on a unit cost basis. Refer to Bid Form.
- B. Fabrication and installation of steel guardrail will be paid on a unit cost or lump sum basis. Refer to Bid Form.
- C. All other miscellaneous metals are incidental to cost of the above items.

PART 2 - PRODUCTS

2.1 Metals – General

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 Steel Plates, Shapes, and Bars

- A. W-Shapes: ASTM A 992.
- B. Channels, Angles: ASTM A 36.
- C. Plates and Bars: ASTM A 36.

2.3 Steel Pipe

- A. ASTM A 53; Type, grade and weight class as indicated on Drawings.

2.4 Slotted Channel Framing

- A. Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches.
 - 2. Material: Galvanized steel, ASTM A 653/A 653M, structural steel, Grade 33 , with G90 coating; 0.108-inch nominal thickness.
 - 3. Material: Cold-rolled steel, ASTM A 1008/A 1008M, commercial steel, Type B; 0.0966-inch minimum thickness; hot-dip galvanized after fabrication.
 - 4.
- B. Galvanized

2.5 Fasteners

- A. Stainless Steel Bolts and Nuts: ASTM F 593 for bolts, ASTM F 594 for nuts.
- B. Lag Bolts: Square head type: ASME B 18.6.3.
- C. Machine Screws: ASME D 18.6.3.
- D. Wood Screws: Flat head: ASME B 18.22.1.
- E. Plain Washers: Round ASME B 18.22.1.
- F. Lock Washers: Helical spring type ASME B 18.22.1.
- G. Anchor Bolts: ASTM F 1554, Grade 36.
- H. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts

2.6 Galvanizing

- A. All steel shall be galvanized except where noted otherwise.
- B. Provide a zinc coating for those items as indicated on Drawings or specified herein to be galvanized; comply with following:
 - 1. Iron and Steel Hardware: ASTM A 153.
 - 2. Rolled, pressed and forged steel shapes, plates, bars and strip 1/8 inch thick and heavier: ASTM A 123. (1.25 oz./sq. ft. min.)
 - 3. Assembled Steel Products: ASTM A 386. (1.25 oz./sq. ft. min.)
- C. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

2.7 Field-Applied Cold Galvanizing

- A. Acceptable Cold Galvanizing compounds are:
 - 1. Z.R.C. Cold Galvanizing Compound, ZRC Worldwide, Marshfield, MA.
 - 2. or Approved Equivalent.

2.8 Adhesive Anchors

- A. Provide sizes and types as indicated on Drawings.
- B. All threaded rods and associated hardware to be Type 303/304 stainless steel.
- C. Injection gel to be two-component epoxy ASTM C 881.
- D. Stainless steel screens as indicated on Drawings or as recommended by Manufacturer.
- E. Installation per Manufacturer's recommendations.
- F. Acceptable materials are:
 - 1. HY 200, Hilti, Inc.
 - 2. PE1000+, Powers Fasteners Inc.
 - 3. Set-XP, Simson Strong-Tie Anchor Systems
 - 4. or Approved Equivalent.

2.9 Grout

- A. Non-Shrink Non-Metallic Grout:
 - 1. Premixed, factory packaged, non-staining, non-corrosive, non-gaseous grout complying with CE CRD-C588. Provide grout specifically recommended by Manufacturer for interior and exterior applications of type specified in this Section.

2.10 Metal Ladders

A. General:

1. Comply with ANSI A14.3, except for elevator pit ladders.
2. For elevator pit ladders, comply with ASME A17.1/CSA B44.

B. Steel Ladders (Hot dip Galvanized):

1. Space siderails 16 inches apart unless otherwise indicated.
2. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 3/4-inch-diameter steel bars spaced 12" o. c.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 1/2 inch in least dimension.
6. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.

PART 3 - EXECUTION

3.1 Inspection

- A. Inspect area to receive Work and report immediately in writing to Engineer, as required in General Conditions, any unacceptable conditions. Do not proceed with Work until unsatisfactory conditions have been corrected in an acceptable manner. Commencement of erection implies acceptance of related Work.
- B. Take field measurements prior to preparation of Shop Drawings and fabrication.

3.2 Fabrication

- A. Preassemble miscellaneous metal items in the fabricating shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only to the extent necessary because of shipping and handling limitations. Clearly mark the units for later reassembly and coordinated installation. Field cutting of miscellaneous metal items not allowed. Field punched holes in metal items for purposes of attachment or other reasons is not allowed.
- B. All steel miscellaneous metals shall be hot dip galvanized unless noted.
- C. Weld all shop connections unless indicated or specified otherwise.
- D. Weld corners and seams continuously and in accordance with requirements of AWS Code.
- E. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

- F. Work to be performed only by welders qualified in accordance with requirements of AWS Code.
- G. Fabricate Work exposed to view true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated on Drawings.
- H. Cut, reinforce, drill and tap miscellaneous metal as may be required to receive finish hardware and similar items of Work.
- I. Fabricate miscellaneous metal to sizes, shapes and profiles and of dimensions to receive adjacent Work.

3.3 Installation – General

- A. Install manufactured items in strict accordance with Manufacturer's current written instructions.
- B. Set all Work accurately to lines and levels, plumb and secure.
- C. Install members, bolts, anchors, etc. to be covered, inserted or built-in as Work progresses.
- D. Provide anchorage devices and fasteners where necessary for securing miscellaneous metal items to in-place construction.
- E. Provide all other Work as indicated on Drawings or necessary to complete miscellaneous metal Work.
- F. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations.
- G. Grind exposed joints smooth. Do not weld, cut or abrade surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- H. Perform cutting, drilling and fitting required for installation. Set Work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels.
- I. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.
- J. Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding Work.

3.4 Repairs and Protection

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.
 - 1. Galvanizing repair areas include but are not limited to:
 - a. Field welded connections
 - b. Damaged galvanized coatings for pieces not rejected per ASTM A 123/A 123M.
 - 2. Zinc Spray (Metallizing) – AWS C2.2
 - a. Surface Preparation: SSPC-SP 10, "Near White Metal."
 - b. Coating thickness shall equal or exceed hot dip thickness requirements per ASTM A 123/A 123M.
 - c. Apply clear top coat.
 - 3. Zinc-Rich Paint
 - a. Surface Preparation: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Coating thickness: Minimum of 6 mils (dry film) to be applied in multiple coats per manufacturer's instructions
 - c. Acceptable materials are:
 - 1) ZRC Cold Galvanizing Compound, Z.R.C. Worldwide, Marshfield, Massachusetts
 - 2) ZRC Galvalite, Z.R.C. Worldwide, Marshfield, Massachusetts
 - 3) or Approved Equal
 - d. Prepare trial areas with ZRC Galvalite and ZRC Cold Galvanizing Compound for Owner review and material selection.

3.5 Cleanup

- A. Remove all dirt, tags, and foreign materials from miscellaneous metals.

Wayne State University
University Services Building Roof and Structure Repairs 2018

WSU Project No. 060-313960

END OF SECTION 05 5700

SECTION 06 1000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Framing with dimension lumber.
 - 2. Wood blocking and nailers.
 - 3. Plywood backing panels.

1.2 REFERENCES

- A. ALSC (American Lumber Standards Committee)
- B. NFPA (National Forest Products Association)
- C. APA (American Plywood Association)

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.

1.4 INFORMATIONAL SUBMITTALS

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

1.5 QUALITY ASSURANCE

- A. Contractor shall install all rough carpentry in accordance with generally accepted industry standard.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: **19 percent or less** unless otherwise indicated.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings, and the following:
 - 1. Framing for raised platforms.
 - 2. Framing for stages.
 - 3. Concealed blocking.
 - 4. Framing for non-load-bearing partitions.
 - 5. Framing for non-load-bearing exterior walls.
 - 6. Roof construction.

2.3 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.4 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide Type 304 stainless steel fasteners.
 - 2. Wood to Concrete / Masonry
 - a. ¼ inch diameter, phillips flat head screw, designed for use with concrete or masonry such as Tapcon by Buildex.
- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- D. Comply with AWWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- E. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- F. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).

3.2 WOOD BLOCKING

- A. Wood securement at roof perimeters shall be in accordance with FM Loss Prevention Data Sheet 1-49.
- B. Fasteners shall be installed in two staggered rows. Spacing in any one row shall not exceed 24 inches. Spacing at corners shall be in accordance with FM Data Sheet 1-49.
- C. Offset blocking layers minimum 12 inches; weave corners.

3.3 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 1000

SECTION 061533 - WOOD PATIO DECKING

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. Plastic decking.
 - 2. Support framing for elevated decks.
- B. Related Requirements:
 - 1. Section 076200 "Sheet Metal Flashing and Trim" for sheet metal flashing used with patio decking.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For preservative-treated wood products, plastic decking and metal framing anchors.

1. For preservative-treated wood products. Include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
 2. For plastic decking and metal framing anchors. Include installation instructions.
- B. Samples: For plastic decking, not less than 24 inches (600 mm) long, showing the range of variation to be expected in appearance of decking, including surface texture.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials under cover and protected from weather and contact with damp or wet surfaces. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.
- B. Handle and store plastic lumber to comply with manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

- A. Comply with DOC PS 20 and with grading rules of lumber grading agencies certified by ALSC's Board of Review as applicable. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by ALSC's Board of Review.
1. Factory mark each item with grade stamp of grading agency.
 2. For items that are exposed to view in the completed Work, mark grade stamp on end or back of each piece.
 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
 4. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content:
1. Boards: 19 percent.
 2. Dimension Lumber: 19 percent.

2.2 DIMENSION LUMBER FRAMING

- A. DeckFraming: Construction or No. 2 grade the following species:
1. Hem-fir (North); NLGA.

2.3 POSTS

- A. Dimension Lumber Posts: Construction or No. 2 grade the following species:

1. Hem-fir or hem-fir (North); NLGA, WCLIB, or WWPA.

2.4 PRESERVATIVE TREATMENT

- A. Pressure treat boards and dimension lumber with waterborne preservative according to AWP A U1; Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground or vegetated roofing products.
- B. Pressure treat timber with waterborne preservative according to AWP A U1; Use Category UC4a.
- C. Pressure treat poles with waterborne preservative according to AWP A U1; Use Category UC4a.
- D. Preservative Chemicals: Acceptable to authorities having jurisdiction.
 1. Do not use chemicals containing arsenic or chromium.
- E. Use process for boards and dimension lumber that includes water-repellent treatment.
- F. After treatment, redry dimension lumber to 19 percent maximum moisture content.
- G. Mark treated wood with treatment quality mark of an inspection agency approved by ALSC's Board of Review.
 1. For items indicated to receive a stained or natural finish, mark each piece on surface that will not be exposed or omit marking and provide certificates of treatment compliance issued by inspection agency.
- H. Application: Treat all wood unless otherwise indicated.

2.5 PLASTIC DECKING

- A. Plastic Lumber, General: Products acceptable to authorities having jurisdiction with current model code evaluation reports that show compliance with building code in effect for Project for indicated type of construction.
 1. Allowable loads and spans, as documented in evaluation reports or in information referenced in evaluation reports, shall not be less than design loads and spans indicated.
- B. Composite Plastic Lumber: Solid or hollow shapes made from a mixture of cellulose fiber and polyethylene or polypropylene.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. TimberTech's Earthwood Evolutions' Legacy
 - b. Trex Company, Inc.

- c. Weyerhaeuser Company.
 - d. Substitutions per section 012500.
- 2. Decking Standard: ICC-ES AC109 or ICC-ES AC174.
 - 3. Decking Size: .94" x 5.360"
 - 4. Configuration: Provide product with grooved edges designed for fastening with concealed decking fasteners.
 - 5. Surface Texture: Woodgrain.
 - 6. Color: As selected by Architect from manufacturer's full range.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.
 - 1. Use fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or ASTM F 2329 unless otherwise indicated.
 - 2. For plastic decking, use concealed fasteners stainless-steel fasteners.
- B. Nails: ASTM F 1667.
- C. Power-Driven Fasteners: ICC-ES AC70.
- D. Wood Screws and Lag Screws: ASME B18.2.1, ASME B18.6.1, or ICC-ES AC233.
- E. Carbon-Steel Bolts: ASTM A 307 (ASTM F 568M) with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers all hot-dip zinc coated.
- F. Stainless-Steel Bolts: ASTM F 593, Alloy Group 1 or 2 (ASTM F 738M, Grade A1 or Grade A4); with ASTM F 594, Alloy Group 1 or 2 (ASTM F 836M, Grade A1 or Grade A4) hex nuts and, where indicated, flat washers.
- G. Postinstalled Anchors: Stainless-steel, chemical or torque-controlled expansion anchors with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing according to ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Stainless-steel bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or Grade A4).

2.7 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Simpson Strong-Tie Co., Inc.

2. Substitutions per section 012500.

- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G90 (Z270) coating designation.
- D. Joist Hangers: U-shaped, with 2-inch- (50-mm-) long seat and 1-1/4-inch- (32-mm-) wide nailing flanges at least 85 percent of joist depth.
 - 1. Thickness: 0.062 inch (1.6 mm).
- E. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch (25 mm) above base and with 2-inch- (50-mm-) minimum side cover, socket 0.062 inch (1.6 mm) thick, and standoff and adjustment plates 0.108 inch (2.8 mm) thick.
- F. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
 - 1. Width: 1-1/4 inches (32 mm).
 - 2. Thickness: 0.062 inch (1.6 mm).
 - 3. Length: 16 inches (400 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION, GENERAL

- A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.
- B. Framing Standard: Comply with AF&PA WCD1 unless otherwise indicated.

- C. Install wood decking with crown up (bark side down).
- D. Install plastic lumber to comply with manufacturer's written instructions.
- E. Secure decking to framing with screws.
- F. Install metal framing anchors to comply with manufacturer's written instructions.
- G. Do not splice structural members between supports unless otherwise indicated.
- H. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- I. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of members or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- J. Apply copper naphthenate field treatment to comply with AWPAC M4, to cut surfaces of preservative-treated lumber.
- K. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. ICC-ES AC708 for power-driven fasteners.
 - 2. "Fastening Schedule" in ICC's International Building Code.
 - 3. "Fastener Schedule for Structural Members" and "Alternate Attachments" in ICC's International Residential Code for One- and Two-Family Dwellings.
- L. Use common wire nails unless otherwise indicated. Select fasteners of size that do not fully penetrate members where opposite side is exposed to view. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads unless otherwise indicated.
- M. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced and with adjacent rows staggered.

3.4 ELEVATED DECK JOIST FRAMING INSTALLATION

- A. General: Install joists with crown edge up and support ends of each member with not less than 1-1/2 inches (38 mm) of bearing on wood or metal, or 3 inches (76 mm) on masonry. Attach floor joists where framed into wood supporting members by using wood ledgers as indicated or, if not indicated, by using metal joist hangers. Do not notch joists.
- B. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches (1200 mm).
- C. Lap members framing from opposite sides of beams or girders not less than 4 inches (102 mm,) or securely tie opposing members together. Provide solid blocking of 2-inch nominal (38-mm actual) thickness by depth of joist over supports.

- D. Provide solid blocking of 2-inch nominal (38-mm actual) thickness by depth of joist at intervals of 96 inches (2438 mm) o.c., between joists.

END OF SECTION 061533

SECTION 07 0150.19 - PREPARATION FOR REROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Full tear-off of roof areas to the structural deck.
 - 2. Removal of base flashings.

1.2 RELATED SECTIONS

- A. 024119 – SELECTIVE DEMOLITION

1.3 REFERENCES

- A. American National Standards Institute (ANSI): Safety Requirements for Demolition, Document A10.6.
- B. Occupational Safety and Health Administration (OSHA): Construction Safety Act, Part 1926.

1.4 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.
- B. Full Roof Tear-Off: Removal of existing roofing system from deck.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.6 INFORMATIONAL SUBMITTALS

- A. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, that might be misconstrued as having been damaged by reroofing operations. Submit before Work begins.
- B. Proposed Protection Measures: Submit demolition procedures, sequencing, permits and notices authoring demolition, method of traffic control, permit for transport and disposal of debris, and location of disposal area.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Approved by warrantor of existing roofing system to work on existing roofing.
- B. Reroofing Conference: Attend conference at Project site.

1.8 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately below reroofing area. Conduct reroofing so Owner's operations are not disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.
 - 1. Coordinate work activities daily with Owner so Owner can place protective dust and water-leakage covers over sensitive equipment and furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below work area.
 - 2. Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below affected area. Verify that occupants below work area have been evacuated before proceeding with work over impaired deck area.
- B. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.
- C. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
- D. Limit construction loads on roof to 40 psf for uniformly distributed loads.
- E. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.

PART 2 - PRODUCTS

2.1 INFILL AND REPLACEMENT MATERIALS

- A. Use infill materials matching existing roofing system materials unless otherwise indicated.
- B. General: Use auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of existing and new roofing system.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Shut off rooftop utilities and service piping before beginning the Work.
- B. Protect existing roofing system that is not to be reroofed.

- C. Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.
- D. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each work day, when no work is taking place, or when rain is forecast.

3.2 ROOF TEAR-OFF

- A. General: Notify Owner each day of extent of roof tear-off proposed for that day and obtain authorization to proceed.
- B. Full Roof Tear-Off: Where indicated, remove existing roofing and other roofing system components down to the deck.
 - 1. Bitumen and felts that are firmly bonded to concrete decks are permitted to remain if felts are dry. Remove unadhered bitumen, unadhered felts, and wet felts.
 - 2. Remove fasteners from deck or cut fasteners off slightly above deck surface.

3.3 DECK PREPARATION

- A. Inspect deck after tear-off of roofing system.
- B. Verify that concrete substrate is visibly dry and free of moisture.
- C. If broken or loose fasteners that secure deck panels to one another or to structure are observed, or if deck appears or feels inadequately attached, immediately notify Owners Representative. Do not proceed with installation until directed.
- D. If deck surface is unsuitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify Owners Representative. Do not proceed with installation until directed.

3.4 BASE FLASHING REMOVAL

- A. Remove existing base flashings. Clean substrates of contaminants, such as asphalt, sheet materials, dirt, and debris.
- B. Do not damage metal counterflashings that are to remain. Replace metal counterflashings damaged during removal with counterflashings of same metal, weight or thickness, and finish.

3.5 DISPOSAL

- A. Collect demolished materials and place in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Transport and legally dispose of demolished materials off Owner's property.

END OF SECTION 07 0150.19

SECTION 07 1800 – TRAFFIC COATINGS

PART 1 - GENERAL

1.1 Related Documents

- A. Conditions of Contract for Construction and General Requirements of Division 1 of these Specifications apply to Work in this Section.

1.2 Work Included

- A. Work of this Section shall include furnishing all labor, materials, equipment and supervision to install a deck coating system, including surface preparation and crack and joint detailing.
- B. Deck coating Installer shall be specifically responsible for providing all preparation Work and joint sealants specified in Section 07 9200, Joint Sealants.

1.3 Related Work

- A. Following Work is related to this Section:

- | | |
|---------------------------|-----------------|
| 1. Concrete Repair | Section 03 0130 |
| 2. Cast-in-Place Concrete | Section 03 3000 |
| 3. Joint Sealants | Section 07 9200 |
| 4. Pavement Markings | Section 32 1723 |

1.4 Quality Control

- A. General
 - 1. Deck coating Installer shall be approved by deck coating Manufacturer.
 - 2. Installer shall have a minimum of five (5) years experience in application of one of the approved deck coating systems and have experience with five projects in size of 25,000 SF or greater.
 - 3. Installer and Manufacturer shall review slope of slabs and condition of surfaces prior to bidding.
 - 4. Manufacturer shall make available a qualified Manufacturer's Representative to assist the Installer and Engineer as specified herein. Representative shall be experienced in placement of deck coating systems. As a minimum, Representative shall be on site to review following procedures:
 - a. Surface preparation.
 - b. Installation of deck coating from primer to top coat for first level or first phase.

5. A preconstruction/preapplication meeting shall be held to discuss detailing, surface preparation, application techniques and procedures, phasing and scheduling. Foreman and lead laborer for Installer will be required to attend meeting along with Contractor, Manufacturer's Representative and Engineer.

B. Testing Requirements

1. Installer shall check deck coating wet film thickness and record test results by taking five wet film readings within a 1 SF area. Wet film thickness testing shall be completed a minimum of once per every 500 SF of deck coating placed or per individual section placed per day. Average film thickness shall be at or above wet film thickness equivalent of specified dry film thickness.

C. Flood Test: Contractor shall arrange for and wet all slabs with water for purpose of detecting any defects in waterproofing which would result in leaks. Slab surfaces shall be wetted until water flows freely to drains. No finished spaces shall be insulated or ceiling installed until drainage test has been completed on the slab above and reviewed by Engineer for acceptance.

1. Potentially leaks are located by noting whether water from flood test is observed at underside of slabs or running down faces of walls. Leaking attributed to defective traffic bearing membrane shall be corrected by repairing waterproofing.

1.5 Submittals

A. Action Submittals

1. System Description: Submit complete description of proposed traffic coating system including materials, surface preparation, joint treatments, terminations, and cure times. Include aggregate materials and repair materials for pitting, bug holes, popouts, and shallow scaling.
2. Product Data: For each type of product, including installation instructions.
 - a. Traffic Coating System
 - b. Substrate Repair Material
 - c. Primer
 - d. Base Coat
 - e. Intermediate Coat (grit coat)
 - f. Top Coat
 - g. Aggregate
3. Shop Drawings: For traffic coatings.
 - a. Include details for treating substrate joints and cracks, flashings, deck penetrations, and other termination conditions.
 - b. Include proposed plan for grid layout to install each coat. Include quantities of materials, square footages, and yield calculations.
4. Color: Submit Manufacturer's standard color chart.
5. Sample Warranty: Submit sample warranty for approval prior to application.

B. Informational Submittals

1. Qualification Data:
 - a. For Installer including projects, size, location, owner, and contact, engineer/architect and contact for projects that traffic coating system has been applied.
 - b. Certification that Manufacturer has approved Installer.
2. Certificates: For each type of traffic coating.
 - a. Certification that the traffic coating system is compatible with all products in Divisions 3 and 7 to which it will come in contact.
 - b. Certification of Manufacturer's approval of surface preparation.
 - c. Certification of Manufacturer's project review and that traffic coating installation is in accordance with written recommendations.
3. Field quality-control reports:
 - a. Results of slab moisture testing completed in accordance with ASTM D 4263 Standard Test Method for Indicating Moisture in Concrete by Plastic Sheet Method.
 - b. Results of wet film thickness testing. Include date, weather, and other pertinent information.
4. Applicator's Manual: For each type of traffic coating.
5. Material Safety Data Sheets: For each product, solvent, or related chemicals to be used and certification that materials conform to local, state, and federal environmental and worker's safety laws and regulations.

1.6 Environmental Requirements

- A. Manufacturer and Installer are required to confirm that all deck coating materials used in accordance with this Section conform to local, state, and federal environmental and workers' safety laws and regulations.
 1. VOC content of materials shall not exceed limits per Environmental Protection Agency Natural Volatile Organic Compound Emission Standards for Architectural Coatings (40CFR59).
- B. Installer is solely responsible for fume control and shall take all necessary precautions against injury to personnel or adjacent building occupants during application. As a minimum, Installer shall take the following precautions:
 1. Provide and maintain barricades.
 2. Locate and protect building air intakes during application.
 3. Follow all state, federal, and local safety regulations.
 4. Follow all Manufacturers' safety requirements.
 5. Dispose empty containers immediately and properly.
 6. Use protective equipment.
 7. Ensure Work area is well vented to outside.

- C. Deck coating shall be installed between 6:00 p.m. and 6:00 a.m. on weekdays and anytime during weekends.

1.7 Transportation and Handling

- A. Deliver all materials to site in original, unopened containers, bearing following information:
 - 1. Name of product
 - 2. Name of Manufacturer
 - 3. Date of Manufacturer
 - 4. Lot or batch number
 - 5. UL Labels
- B. Store materials under cover, protected from weather, within Manufacturer's recommended temperatures ranges.
- C. Replace containers or materials showing any signs of damage with new material at no additional cost to Owner.
- D. At no time shall weight of stored material placed on a slab area exceed 30 PSF or 2,000 lbs. over 20 square inches.

1.8 Warranty

- A. Provide to Owner a Warranty by Installer and Manufacturer that deck coating system will be free of defects, water penetration, and chemical damage related to system design, workmanship or material deficiency, consisting of, but not limited to:
 - 1. Surface crazing of other weathering deficiency (including ultraviolet light exposure).
 - 2. Abrasion or tear failure resulting from normal traffic use.
 - 3. Tear failure resulting from new or existing cracks in substrate not exceeding 1/16 inch in width.
 - 4. Debonding from substrate or delaminating between layers.
 - 5. Defective installation.
 - 6. Debonding or damage of repair material used for filling in pitting, bug holes, popouts, and shallow scaling with concrete or deck coating material.
- B. Warranty shall be "Joint and Several" in which Installer and Manufacturer will jointly and severally warrant and provide at no charge to Owner materials and labor needed to properly repair or replace product and replace parking stripes within duration of Warranty. In event of either party's non-performance, full burden and responsibility for any Warranty repair shall fall upon remaining party.
- C. Vandalism, abrasive maintenance equipment, and construction traffic are not normal traffic use and are exempt from Warranty.

- D. Normal traffic is considered to include snow removal equipment with rubber tipped blades as described in National Parking Association publication, "Parking Garage Maintenance Manual".
- E. New concrete may experience shrinkage. Installer shall provide system suitable for such application. Warranty shall cover deck coating damage due to new concrete slab cracking not exceeding 1/16 inch.

1.9 Warranty Duration

- A. Bid price shall include a five (5) year Warranty commencing with date of project acceptance in accordance General Conditions.
- B. Although completed areas of facility may be reopened to traffic and parking, commencement of Warranty period will not occur prior to acceptance of entire project.
- C. A single Warranty commencement date will apply to all waterproofing.

1.10 Basis of Payment

- A. Deck coating preparation and application will be paid on a unit price or lump sum basis. Refer to Bid Form.
- B. Detail coats over cracks, construction joints, cove joints, etc. are to be incidental to deck coating cost.

PART 2 - PRODUCTS

2.1 Deck Coating - General

- A. Deck coating system shall be a fluid applied, waterproof, traffic bearing elastomeric membrane capable of preventing penetration of concrete by water, gasoline, oils, greases, salts, deicer chemicals, battery acids and radiator coolants.
- B. Color of deck coating shall be gray with Owner selecting shade of gray from standard color chart submittal.
- C. Material to fill in pitting, bug holes, popouts, and shallow scaling shall be in accordance with Manufacturer's written recommendations.
- D. Same Manufacturer's deck coating system shall be used throughout.
- E. Deck coating thicknesses specified herein are minimum dry film thicknesses and do not include the aggregate. Specified thicknesses may vary from Manufacturer's literature. A coat may have to be installed in more than one layer to achieve minimum thickness or on ramps a slope grade

version of deck coating material shall be used. Install each coat in accordance with Manufacturer's recommended yield for required thickness.

- F. Thinner or solvent shall not be added to deck coating materials.
- G. All deck coating shall utilize a UV stable topcoat.
- H. Top coat shall be seeded with aggregate and back rolled.

2.2 Deck Coating System (Solvent Free System)

- A. Provide a heavy duty epoxy deck coating system as indicated on Drawings.
- B. Approved heavy duty epoxy solvent free deck coating systems are:
 - 1. Iso-Flex 760 EU HL (extreme duty), LymTal International, Inc., Orion, MI. Primer, base coat at 25 mils, epoxy grit coat at 25 mils, and a top coat at 18 mils.
 - 2. Auto-Gard E Severe Duty, Neogard Corp., Dallas, TX. Primer, base coat at 25 mils, epoxy grit coat at 25 mils, and a top coat at 18 mils.
 - 3. MasterSeal Traffic 2530, BASF Building Systems, Shakopee, MN. Primer, base coat at 25 mils, epoxy grit coat at 25 mils, and a top coat at 18 mils.
 - 4. Mark-170.2 Flexodeck II, Polycarb, Inc., Cleveland, Ohio. Primer, base coat at 25 mils, epoxy grit coat at 25 mils, and a top coat at 18 mils.
 - 5. Kelmar FWC III, Technical Barrier Systems, Inc., Oakville, Ontario. Primer, base coat at 25 mils, epoxy grit coat at 25 mils, and a top coat at 18 mils.
 - 6. Flexdeck System, RPM Company, Cleveland, OH. Primer, base coat at 25 mils, epoxy grit coat at 25 mils, and a top coat at 18 mils.
 - 7. Sikalastic 720/Sikadur 22 Lo-Mod, Sika Corporation, Lyndhurst, NJ. Primer, base coat at 25 mils, epoxy grit coat at 25 mils, and a top coat at 18 mils.

2.3 Recoat System (Solvent Free System)

- A. Provide a heavy duty epoxy recoat system as indicated on Drawings.
- B. Approved heavy duty epoxy solvent free recoat systems are:
 - 1. Iso-Flex 760 EU HL (extreme duty), LymTal International, Inc., Orion, MI. Epoxy grit coat at 25 mils, and a top coat at 18 mils.
 - 2. Auto-Gard E Severe Duty, Neogard Corp., Dallas, TX. Epoxy grit coat at 25 mils, and a top coat at 18 mils.
 - 3. MasterSeal Traffic 2530, BASF Building Systems, Shakopee, MN. Epoxy grit coat at 25 mils, and a top coat at 18 mils.
 - 4. Mark-170.2 Flexodeck II, Polycarb, Inc., Cleveland, Ohio. Epoxy grit coat at 25 mils, and a top coat at 18 mils.
 - 5. Kelmar FWC III, Technical Barrier Systems, Inc., Oakville, Ontario. Epoxy grit coat at 25 mils, and a top coat at 18 mils.

6. Flexdeck System, RPM Company, Cleveland, OH. Epoxy grit coat at 25 mils, and a top coat at 18 mils.
7. Sikalastic 720/Sikadur 22 Lo-Mod, Sika Corporation, Lyndhurst, NJ. Epoxy grit coat at 25 mils, and a top coat at 18 mils.

2.4 Deck Coating Aggregate

- A. Approved aggregates for heavy duty deck coating systems shall be a size of 12/20 and approved by coating manufacturer.

PART 3 - EXECUTION

3.1 General

- A. Inspect surfaces to receive Work and report immediately in writing to Engineer as required in General Conditions any deficiencies in surface which render it unsuitable for proper execution of this Work. Do not proceed with Work until unsatisfactory conditions have been corrected in an acceptable manner in accordance with Engineer.
- B. Coordinate and verify that related Work meets following requirements:
 1. Concrete surfaces are finished, cleaned and prepped, and have completed required curing period.
 2. Previous surface treatments have been removed or are compatible with the systems to be installed.
 3. Systems selected for use are compatible with each other.
 4. All concrete repairs are completed.
 5. Sealant installation may occur several months prior to deck coating. Installer to repair damaged or defective sealants prior to deck coating installation.

3.2 Preparation

- A. Remove all oil, grease spots, and contaminates in accordance with Manufacturer's recommendations.
- B. Remove all existing striping.
- C. Shotblast all concrete surfaces to receive deck coating. Shotblast equipment performance requirements are as follows:
 1. Equipment shall be capable of traveling at a constant speed to provide uniform profile. Speed and size of equipment and size of steel shot shall be selected to provide desired preparation without causing unnecessary damage to concrete surface.

2. Equipment shall vacuum up, or otherwise retain all dirt, dust, and debris from blasting operation.
 3. Areas inaccessible to shotblaster (i.e. vertical surfaces, against walls, columns, stairways, etc.) are to be abrasive blasted or abraded to same performance.
 4. Shotblasted surface must be clean with a profile in which a minimum 1/16 inch of existing concrete surface is removed. Fine aggregates must be exposed; however, coarse aggregate must not be exposed. All laitance must be removed. Surface profile to match ICRI CSP5 in accordance with ICRI Guideline No. 03732, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.
 5. Remove debris immediately after surface preparation. Debris includes, but is not limited to, shot, aggregate and dust. Debris shall be placed in a covered dumpster or a covered area where it will not be rebroadcast by wind or weather.
- D. Metal surfaces that are to be deck coated shall be abrasive blasted to near white metal, SSPC SP10 in accordance with Steel Structures Painting Council Painting Manual. Rust inhibitive primer shall be installed in accordance with Manufacturer's recommendations within 8 hours of abrasive blasting.
- E. Rout and seal cracks greater than 15 mils in accordance with Section 07 9200, Joint Sealants or as required by the Manufacturer. Cracks, coves, terminations and all unusual situations shall be detailed per Manufacturer's recommendations.
- F. Installer shall be responsible for repair or replacement of all materials damaged by surface preparation operations.
- G. Surfaces shall be air blown with sufficient pressure to remove excess dirt, dust and debris, and to assure that concrete is clean prior to application of deck coating.
- H. After shotblasting and abrasive blasting and prior to first coat of deck coating, pitting, bug holes, popouts, and shallow scaling shall be prepared in accordance with Manufacturer's recommendations. As a minimum, a thin epoxy mortar shall be used to fill voids.

3.3 Installation/Application

- A. Do all Work in strict accordance with Manufacturer's written instructions and specifications and as indicated herein.
- B. Do not apply deck coating materials until concrete has been air dried at temperatures at or above 40 degrees F. for at least 28 days after curing period specified in Section 03 3000, Cast-In-Place Concrete, Section 03 0130, Concrete Repair, or as otherwise approved by Manufacturer.
- C. Concrete shall be dry prior to application of deck coating. Installer shall perform slab moisture testing in accordance with ASTM D 4263 Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method. Testing must be performed in at least 1 location for every 10,000SF of coating. Use of heat lamps for performing tests may be required in areas not exposed to sunlight.

- D. Do not apply deck coating material until concrete and air temperature is at or above 40 degrees F. Provide appropriate enclosures and necessary heating for application. Air temperatures directly below and above the slab being coated must be maintained at a minimum of 45 degrees F up to 48 hours prior to coating and at 45 degrees F for a minimum of 72 hours after coating, or as required for full curing of material. Provide high/low thermometers within Work area. As a minimum, provide two thermometers directly below slab and two directly above slab being coated.
- E. All deck coating shall maintain straight edges at terminations.
- F. Surfaces to be deck coated shall be divided into areas in accordance with the Manufacturer's recommended yield for the specified thickness and for specific container size of material. Area is to be divided by keel marks, or another Engineer approved method.
- G. All sealants to be provided adequate cure time, minimum 8 hours, to be tack free prior to deck coating. All construction joints, control joints, joints at perimeter of patches, cold joints and cracks (sealed and unsealed) shall receive a detail coat, minimum of 4 inches wide. Detail coat shall be same thickness as base coat unless Manufacturer's requirements are stricter. Detail coat shall cure a minimum of 12 hours prior to base coating.
- H. Extend deck coating up vertical surfaces as indicated on Drawings.
- I. Incorporate aggregate until refusal. Aggregate until refusal will result in a surface that is tan in color. Additional aggregate may have to be added after first pass. Seed topcoat with aggregate and backroll.
- J. Complete all Work under this Section before painting line stripes.

3.4 Damage and Repairs

- A. Any necessary repairs for deck coating resulting from dry film testing are to be repaired by Installer.
- B. Pinholing of deck coating will be cause for rejection. Installer shall repair and take necessary steps to prevent pinholing to occur at no additional expense to Owner.

3.5 Cleanup

- A. Remove all excess primer, sealant, deck coating, and masking materials from structure.

END OF SECTION 07 1800

SECTION 07 5419 - POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - **GENERAL**

1.1 SUMMARY

A. Section Includes:

1. Adhered polyvinyl-chloride (PVC) roofing system.
2. Roof insulation.

1.2 RELATED SECTIONS

- A. 07 6200 – Sheet Metal Flashing and Trim

1.3 REFERENCES

- A. ASTM D4434, Standard Specification for Polyvinyl Chloride Sheet Roofing
- B. ASTM D5036, Standard Practice for Application of Adhered Poly (Vinyl Chloride) Sheet Roofing
- C. FM - Roof Assembly Classifications.
- D. UL - Fire Hazard Classifications.

1.4 SYSTEM DESCRIPTION

- A. U.L. Class A system.
- B. FM Global Class 1-60 system.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Roofing Conference: Attend conference at Project site.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Verification: For the following products:
1. Sheet roofing, of color required.
 2. Walkway pads or rolls, of color required.

1.7 INFORMATIONAL SUBMITTALS

- A. Research/Evaluation Reports: For components of roofing system, from ICC-ES.
- B. Sample Warranties: For manufacturer's special warranties.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.

1.9 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Products used in the work included in this section shall be produced by manufacturers regularly engaged in the manufacture of similar items and with a history of successful production acceptable to the Owner.
- B. Qualifications of Contractor: The Contractor and his personnel shall be currently approved by the manufacturer of this approved product as qualified to install the materials of this section.
- C. Qualifications of Installers: Use an adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this section.
- D. Roofing Inspections: Make all required notifications and secure all required inspections by the manufacturer of the approved materials to facilitate issuance of the specified roof warranty.

1.10 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. As provided elsewhere.
- B. Coordinate delivery with Owner's Representative.
- C. Prevent wrappers and packaging materials from inclusion in the roofing system.
- D. All adhesives, primers, and caulking shall be stored between 60 degrees F. and 80 degrees F. Should they be exposed to lower temperatures, restore to room temperature prior to use. Primers and caulking exposed to freezing temperatures shall not be used and shall be removed from the job site.
- E. Material containers, mixing, and dilution:
 - 1. Containers shall be closed and sealed except when materials are being removed.
 - 2. Follow Manufacturers' instructions for mixing and stirring.
 - 3. Cements, adhesives, primers, coatings, and sealants which have been diluted or cutback, after their manufacture shall not be incorporated into the Work.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. Work shall not commence during inclement weather.

- B. Work shall not commence on a day when precipitation is imminent or probable.
- C. Work shall not proceed over damp substrates.
- D. Cold weather application procedures shall be employed when sustained ambient temperature is less than 40 degrees Fahrenheit:

1.12 SEQUENCING AND SCHEDULING

- A. As provided in elsewhere.
- B. Proceed with insulation application concurrently with membrane roofing.
- C. Phasing of insulation will not be acceptable.
- D. Proceed with permanent flashing installation concurrently with membrane roofing.
- E. Proceed with membrane roofing application concurrently with Section 061000 Rough Carpentry and Section 076200 Roof Related Sheet Metal.
 - 1. Arrange Work to avoid construction traffic over completed Work.
 - 2. Materials and equipment shall not be stored on completed Work.
 - 3. Provide repairs on traffic induced damage to roofing not previously scheduled for work on the day the damage occurs.

1.13 CAUTIONS

- A. Do not use oil base or plastic roof cement in connection with PVC roofing system.
- B. Waste products (petroleum, grease, oil and solvents, vegetable or mineral oil and animal fat) shall not be allowed to come in contact with the PVC roofing system.
- C. Steam venting shall not be allowed to come in direct contact with the PVC roofing system.
- D. Adhesives are extremely flammable and/or toxic. Use precautions indicated on can and carton labels.

1.14 GUARANTEE AND WARRANTIES

- A. The Contractor shall warrant for a period of two (2) years from the date of Substantial Completion, all portions of the Work not within the scope of the manufacturer's warranty. Contractor's warranty repairs and replacements shall be performed promptly upon notice by the Owner and at no cost to the Owner.
- B. Roof insulation, roof insulation adhesive, membrane, membrane adhesive, membrane fasteners and plates and flashings installation on all roof sections shall be such as to provide for a fifteen (15) year roof membrane manufacturer's "Full System" NDL labor and warranty. As part of the work of this section, pay all required fees, secure all required inspections, and complete all items necessary to secure and deliver to the owner a fifteen (15) year roof membrane manufacturer's "Full System" NDL labor and warranty. The completed and approved warranty agreement shall be delivered to the Owner before final payment will be made. The guarantee shall provide for repair and replacement of defective Work at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain components including roof insulation, fasteners and accessories for the roofing system from manufacturer approved by membrane roofing manufacturer.

2.2 PVC ROOFING

- 1. Fully adhered PVC roof membrane to be nominal 60-mil thickness, polyester reinforced thermoplastic sheet membrane.
- 2. Approved Manufacturer/Products
 - a. UltraGard® SR 60 by Johns-Manville (color to be white)
 - b. Sure-Flex 60 by Carlisle Syntec (color to be white)
 - c. EverGuard PVC 60 by GAF Materials Corporation (color to be white)
 - d. S327 60 mil membrane by Sika Sarnafil. (color to be white)
 - e. Or pre-approved equal
- 3. Flashing Membrane
 - a. Fully adhered PVC baseflashing membrane to be nominal 60-mil thickness, reinforced thermoplastic sheet membrane.
 - b. Approved Manufacturers/Products
 - 1) Same as 2.2.2.

2.3 AUXILIARY PVC ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
 - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.
- C. Bonding Adhesive: Manufacturer's standard solvent-based contact adhesive.
- D. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.
- E. Membrane Coated Sheet Metal: 24 or 26 Ga. galvanized steel sheet with factory laminated thermoplastic membrane coating as manufactured by the various membrane manufacturers (color to be white).
- F. Pipe Boot Flashings: Manufacturer approved pre-molded PVC boot flashings are to be installed, without cutting, wherever possible as shown on the detail drawings. Manufacturer approved pre-molded PVC pipe boot flashings are to be manufactured with a base constructed from 60 mil reinforced PVC membrane and a cone constructed from 60 mil non-reinforced thermoplastic PVC membrane.
- G. Inside and Outside Corners: Manufacturer approved pre-molded PVC inside and outside corner flashings are to be installed, without cutting, wherever possible at all inside and outside corner flashing details. Manufacturer approved pre-molded PVC inside and outside corner flashings are to be manufactured from 60-mil thick non-reinforced thermoplastic PVC membrane.

- H. Walkway Pads: Walkway Pads are to a minimum of 36" in width and shall be manufactured from nominal 100 mil thick, texturized, non-reinforced thermoplastic PVC membrane. Color to be tan or sandstone or as approved by the Owner. (If the membrane is supplied in a continuous roll, each installed single length of between 30 and 36 inches shall be considered as one (1) pad for purpose of payment.
- I. Pourable Sealer
 - 1. Two component polyurethane Pourable Sealer by Johns-Manville (or other pourable sealers as approved by the roof membrane system manufacturer).
- J. Water cut-off mastic: As approved by the roof system manufacturer.
- K. Membrane Cleaner: Top Job, MEK or manufacturer recommended cleaner.
- L. System Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.
- M. Nail Systems: Hot dipped galvanized coated or hot dipped zinc coated roofing nail, 12 gauge, 3/8 inch head, and 1½" long minimum for the attachment of the roof membrane and/or membrane coated metal flashings to wood nailers as shown on the drawings, if acceptable to the roof system manufacturer.
- N. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.
- O. Miscellaneous Accessories: Provide metal termination bars, metal battens, pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.
- P. Other Materials: All other materials not specifically described but required for a complete and proper installation of the work in this section shall be as selected by the Contractor, approved by the manufacturer, and subject to the approval of the Owner and/or consultant.

2.4 ROOF INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 felt or glass-fiber mat facer on both major surfaces.
- B. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/8" per foot or as indicated on the project drawings.
- C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain.

2.5 INSULATION ACCESSORIES

- A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

- B. Insulation Adhesive: Insulation manufacturer's recommended low-rise foam adhesive formulated to attach roof insulation to substrate or to another insulation layer.

PART 3 - EXECUTION

3.1 GENERAL

- A. Perform all related work specified elsewhere necessary for the installation of the specified membrane system.
- B. Ensure that fasteners do not penetrate conduits, wires or other miscellaneous items on bottom side of the deck.
- C. Contractor shall perform daily field test welds. Test welds shall be performed each morning and each afternoon that hot air robot welding is scheduled to be done. Should any aspect of the hot air welding be suspected, Contractor is to take an 8" x 8" seam sample at the location indicated by the consultant to check for seam integrity. Contractor shall take up to two samples for every 2,500 square feet if requested (up to 12 samples in total for the 15,000 sf roof). Contractor is responsible for immediately repairing sample area with new membrane material.
- D. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- E. Coordinate installing roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday.
- F. Install roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition.

3.2 SURFACE CONDITIONS

- A. Surfaces scheduled to receive roofing are to be free of any standing water, frost, snow or loose debris.
- B. Substrate is to be smooth, free of sharp projections and free of obvious depressions.
- C. All necessary metal fittings are to be in place before roofing.
- D. All required nailers shall be securely installed prior to roofing.
- E. All surfaces scheduled to receive membrane must be free of physical contact with any bituminous surfaces, clean, and smooth.
 - 1. Install protection layer of material (e.g. fleece separation sheet) as recommended by the manufacturer where contact with bituminous materials cannot be avoided.

3.3 INSULATION INSTALLATION

- A. General

1. Install new tapered insulation as shown on the plan drawings. Cutting of panels should be done in advance of the application of the adhesive to avoid flakes and materials from getting stuck into the adhesive in advance of setting the boards.
2. Examine the top surfaces of the cleaned and prepared decking for suitability to receive layers of insulation. Do not begin installation until top surfaces of the deck has been properly prepared.
3. For multiple layers of insulation, verify that the top surface of the previously installed layer of insulation is dry, clean, and free of dirt, dust and foreign materials that could impede proper insulation adhesion.
4. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.5 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
5. Verify that all insulation pieces have been cut as necessary to fit tightly around perimeters, curbs and penetrations prior to installation.
6. Verify that roof drains, roof curbs, nailers, equipment supports, vents, and other roof accessories are secured properly and installed in conformance with drawings and submittals.
7. Inspect all equipment required to perform the work to ensure the equipment is in proper working condition as recommended by the manufacturer.
8. Insulation adhesive shall be applied per the requirements of the insulation adhesive manufacturer to meet FM Global 1-60 wind uplift requirements and as required by any separate adhesion warranty.
9. As a minimum, the insulation adhesive shall be dispensed at a rate of one (1) lineal foot of $\frac{3}{4}$ " - 1" diameter bead of insulation adhesive for every square foot of roof insulation board to be attached, applied in a 12" o.c. serpentine pattern. The amount of insulation adhesive shall be increased at the perimeters of the roofs, as required by the insulation adhesive manufacturer to meet FM 1-60 wind uplift requirements or as required by the any separate attachment warranty. (The rates of adhesives may exceed this minimum, but shall not be less than this minimum).
10. The adhesive must be allowed to rise $\frac{3}{4}$ " to 1" before setting the board into the adhesive.
11. Place the insulation boards into the adhesive beads within three (3) minutes of the application of the adhesive and weigh down the boards immediately to spread the beads for maximum contact. Weigh down the insulation boards until the insulation board is firmly attached (usually 10 – 45 minutes depending on weather and temperature).
12. Cut all layers of new roof insulation on all roof sections to fit tightly at all perimeter, curbs and penetrations.

3.4 ADHESIVE ATTACHMENT OF ROOFING MEMBRANE

A. Membrane Bonding

1. Execute work such that the membrane can be temporarily sealed on a down slope surface at the end of each day according to daily seal procedures.
2. Position membrane over the insulation substrate without stretching and allow membrane to relax approximately $\frac{1}{2}$ hour prior to bonding.
3. Membrane sheets **must** be positioned in a manner to facilitate the flow of water **over** the field seams wherever possible.
4. Fold sheet back so that half of the underside of the sheet is exposed. Sheet fold shall be smooth without wrinkles or buckles.
5. Apply bonding adhesive evenly, without globs or puddles, with a 9-18 inch wide $\frac{3}{8}$ - $\frac{1}{2}$ inch nap paint roller to the substrate at the rate specified on the container label. If a spray applicator is used, paint rollers shall be used in combination with the spray applicator. **DO NOT APPLY BONDING ADHESIVE TO THE LAP AREA.**
6. Do not allow the adhesive to skin over or dry.

7. Roll the membrane onto the coated substrate while avoiding wrinkles.
8. BRUSH down the bonded half of the sheet, immediately after rolling the sheet into the adhesive, with a soft bristle push broom to achieve maximum contact and work out air bubbles starting from the center out. Contractor shall be allowed to roll in the membrane using a weighted roller if recommended by the Manufacturer over the broom in method.
9. Fold back the un-bonded half of the sheet and repeat the bonding procedure.
10. Install adjoining sheets in the same manner, overlap edges a minimum of 2 inches.

3.5 MEMBRANE SEAMING

- A. Seaming area is to be clean and free of dust, dirt, or debris.
- B. All seams are to be welded using a hot air welder approved by the manufacturer. All seams are to be welded daily.
- C. All seams are to be fully welded daily a minimum of 1.5" (nominal 2") from the edge of the lap joint.
- D. Seams are to be allowed to cool and then checked for fishmouths and other voids. All necessary repairs are to be made daily by hot air welding.
- E. After careful inspection, all cut edges of membrane are to be caulked using manufacturer supplied seam caulk, if required by the roof system manufacturer. Cut membrane edge seams are to be seam caulked at the end of each day's work.

3.6 MEMBRANE TERMINATION

- A. The membrane is to be secured at the roof perimeters, curbs, walls projections and changes in plane greater than 15° at 12" o.c. maximum using manufacturer approved fasteners and plates, or other means approved by the manufacturer.
- B. Wood nailers are required at perimeter gravel stops or drip edges. Wood nailers must be anchored to resist a minimum pull of 175 lbs. per foot. Membrane may be secured to the wood nailers at perimeter gravel stops or drip edges with roofing nails, if acceptable to the roof system manufacturer.
- C. Membrane is to be secured at roof perimeters and all flashing details as shown on the drawings and as required by the roof system manufacturer.

3.7 FLASHINGS

- A. Flashings are to be of the same material as the field sheet or as required by the roof system manufacturer for the specified warranties.
- B. All flashings are to be totally adhered to the base substrates. Unadhered flashings will not be approved.
- C. Flashings are to extend approximately 6" onto roof membrane so as to achieve a 1.5" continuous weld at least 2 inches beyond the membrane securement fastener and plate.
- D. Pitch pans are to be avoided unless shown on the drawings.

- E. Flashings are to be secured at the top edge with fasteners space a maximum of 6" O.C. through metal termination bars under metal counterflashings and/or as shown on the drawings.
- F. All flashings are to be installed per the detail drawings and shall be pre-approved by the roof system manufacturer for the specified warranties.
- G. Where flashing heights exceed the limits established by the roof system manufacturer, additional intermediate baseflashing securement shall be installed and sealed, per the manufacturer's requirements/recommendations.
- H. Pre-molded inside and outside corner pieces, boot flashings and other flashing accessories shall be installed wherever possible without cutting.

3.8 TEMPORARY WATER CUT-OFF

- A. Temporary water cut-offs are to be constructed at the end of each working day to protect the insulation, roofing, building, and building interior from damage due to wind, snow, and rain.
- B. Construction of temporary water cut-off is to be detailed by the Contractor and approved by the manufacturer and Owner.
- C. Remove all contaminated roof membrane as a result of temporary water cut-offs before proceeding with roofing system application.

3.9 WALKWAY PADS

- A. Install walkway pads at the top and bottom of all wall mounted ladders and at the roof hatch or other scheduled roof access locations. Care should be taken to not install walkway pads over field and/or flashing laps wherever possible. Exact locations will be determined in the field at the time of construction.
- B. A minimum gap of 6" is required between adjoining sections of walkway pads for proper water drainage.
- C. Walkway pads are to be continuously welded to the membrane field sheet a minimum of 1.5" around the entire perimeter of the walkway pads. Gaps may be left on the down-slope side of the walkpad to allow water to drain "out" from under the walkpad.

3.10 CLEANUP

- A. The Contractor shall clear the construction areas and shall provide all necessary removal from the building site of all his construction debris.
- B. All debris shall be removed from the premises promptly and the construction area left clean daily.
- C. Contractor is responsible to assure that his subcontractors have properly removed and disposed of all debris relating to their contract.
- D. At the completion of the contract, Contractor is to remove and dispose of all debris related to his contract.

END OF SECTION 07 5419

SECTION 07 6200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Provide new sheet metal work in connection with roofing as indicated on the drawings and specified herein.
 - 2. New masonry through wall flashing

1.2 RELATED SECTIONS

- A. 075419 – Polyvinyl Chloride (PVC) Roofing

1.3 REFERENCES

- A. Copper, Brass, and Bronze Handbook Sheet Copper Applications, published by the Copper development Associations, Inc., (CED), New York, NY.
- B. Factory Mutual Loss Prevention Data Sheet 1-49.
- C. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For sheet metal flashing and trim.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Distinguish between shop- and field-assembled work.
 - 3. Include identification of finish for each item.
 - 4. Include pattern of seams and details of termination points, expansion joints and expansion-joint covers, direction of expansion, roof-penetration flashing, and connections to adjoining work.
- C. Samples:
 - 1. For each exposed product and for each color and texture specified.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1. For copings and roof edge flashings that are SPRI ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.
 - B. Mockups: Build mockups to verify selections made under Sample submittals to demonstrate aesthetic effects and to set quality standards for fabrication and installation.
 1. Build mockup of typical roof, including gutter, fascia, or counterflashing. Mock up shall include one corner and one joint for each type of metal condition.
- 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING
- A. As designed elsewhere.
 - B. Coordinate delivery with Owner's on-site representative.
 - C. Prevent wrappers and packaging materials from inclusion in the roofing system.
 - D. Ensure that materials are properly stored on dunnage on roof surfaces in such a manner that none of the existing or new roof membrane is damaged as result of the storage and handling procedures.
 - E. Ensure that all materials stored on the roof are adequately tied and ballasted at all time to prevent blow off.
 - F. Material containers, mixing, and dilution
 1. Containers shall be closed and sealed except when materials are being removed.
 2. Follow Manufacturers' instructions for mixing and stirring.
 3. Cements, adhesives, primers, coatings, and sealants which have been diluted or cut-back, after their manufacture shall not be incorporated into the Work.
- 1.7 SEQUENCING AND SCHEDULING
- A. Proceed with permanent sheet metal installations concurrently with membrane roofing.
- 1.8 WARRANTY
- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to

defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

2.2 SHEET METAL MATERIALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Stainless-Steel Sheet: Minimum 22 gage, ASTM A 240/A 240M, Type 304, dead soft, fully annealed; 2D (dull, cold rolled), or 2B (bright, cold rolled are approved finishes).
- C. Metallic-Coated Steel Sheet: Minimum 24 gage, zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 (Z275) coating designation; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Surface: Manufacturer's standard clear acrylic coating on both sides.
 - 2. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 3. Color: As selected by Owners Representative from manufacturer's full range.
 - 4. Cleats: Minimum 22 gage continuous.
- D. Termination Bar: Aluminum, 1/8 inch by 1 inch (minimum), slotted holes 4 inches on center, top edge flat or with caulk dip depending on application.

2.3 UNDERLAYMENT MATERIALS

- A. Flexible Sheet Flashing for Through Wall Flashing: Self, adhering, reinforced, rubberized asphalt sheet membrane; minimum 40 mil thick;
 - 1. Perma-A-Barrier Wall Flashing by WR Grace or approved substitute.
 - 2. Primer: "Perma-A-Barrier Surface Conditioner" or as recommended by the sheet Manufacturer.
 - 3. Seam and lap Joints Membrane: Rubberized, asphalt based liquid membrane
 - a. Bituthene Liquid Membrane by WR Grace or approved substitute.
- B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 - 3. Fasteners for Zinc-Coated (Galvanized): Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Solder:
 - 1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
 - 2. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Obtain field measurements for accurate fit before shop fabrication.
 2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- F. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections. Furnish flat-stock gutter brackets and gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
- B. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.
1. Hanger Style: Straps
 2. Fabricate from the following materials:
 - a. Galvanized Steel: 24 gauge, 0.022 inch (0.56 mm) thick.
- C. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fabricate from the following materials:
1. Stainless Steel: 0.019 inch (0.48 mm) thick.
 2. Galvanized Steel: 0.028 inch (0.71 mm) thick.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 - 4. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 - 1. Coat concealed side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
 - 2. Use lapped expansion joints where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work.
 - 1. Do not solder metallic-coated steel or aluminum sheet.
 - 2. Do not use torches for soldering.

3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 4. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
 5. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.
- H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.2 ROOF-DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints or joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
1. Install gutter with expansion joints at locations indicated, but not exceeding, 40 feet (15.24 m) apart. Install expansion-joint caps.
- C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c.
- D. Parapet Scuppers: Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

3.3 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend

counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints minimum of 4 inches (100 mm).

- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.
- G. Termination Bar: Install along top edge of base flashing after installing butyl sealant behind the base flashing membrane as shown on the detail drawings. Fasten 6 inches on center. Caulk top edge of termination bar with approved sealant.

3.4 THROUGH WALL FLASHING INSTALLATION

- A. Remove existing mortar and clean surfaces that are to receive flashings.
- B. Install prefabricated pan flashings with maximum 24 inch legs with soldered seams at transitions and corners. Incorporate soldered end dams at all flashing terminations. Otherwise, fabricate and install flashings with maximum available lengths.
- C. In field of walls, overlap pan flashing ends a minimum four (4) inches. Set overlapped ends in full bed of waterproofing liquid mastic compatible with flexible sheet membrane.
- D. Fully adhere flexible sheet membrane to horizontal leg of metal pans and to clean, sound inboard wall surfaces. Use primer on inboard wall surfaces as required for proper adhesion. Lap ends of sheet flashing a minimum six (6) inches. Seal all flashing ends and terminations with compatible liquid mastic.
- E. Install termination bar to top of flexible sheet membrane with masonry anchors at maximum 12 inches on center and encapsulate top edge with compatible liquid mastic.
- F. At masonry expansion joints, flashing system shall run continuously through without termination.

3.5 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 07 6200

SECTION 077200 - ROOF ACCESSORIES

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. Roof curbs.
 - 2. Roof hatches.
- B. Related Sections:
 - 1. Section 055000 "Metal Fabrications" for metal vertical ladders, ships' ladders, and stairs for access to roof hatches.
 - 2. Section 055213 "Pipe and Tube Railings" for safety railing systems not attached to roof-hatch curbs.
 - 3. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.
 - 4. Section 086200 "Unit Skylights" for single- and double-glazed domed plastic skylights with curb frame.

1.3 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of roof accessory.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

1.5 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design roof curbs to comply with wind performance requirements, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Wind-Restraint Performance: As indicated on Drawings.

2.2 ROOF CURBS

- A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Wasco's WRC3 (16" tall), Aluminum finish, thermally broken and insulated.
 - a. Substitutions per 012500.
 - B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
 - C. Supported Load Capacity: See structural drawings.

2.3 ROOF HATCH

- A. Roof Hatches: Metal roof-hatch units with lids and insulated double-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, straight sides and integrally formed deck-mounting flange at perimeter bottom.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Bilco's S-20 or comparable product by one of the following:
 - a. Substitutions per 012500
- B. Type and Size: Single-leaf lid, 30 by 36 inches.
- C. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.
- D. Hardware: Spring operators, hold-open arm, [galvanized][stainless]-steel spring latch with turn handles, [galvanized][stainless]-steel butt- or pintle-type hinge system, and padlock hasps inside and outside.
- E. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.
 - 1. Operation: Post locks in place on full extension; release mechanism returns post to closed position.
 - 2. Height: 42 inches above finished roof deck.
 - 3. Material: Steel tube.
 - 4. Post: 1-5/8-inch diameter pipe.
 - 5. Finish: Manufacturer's standard baked enamel or powder coat.
 - a. Color: Safety yellow.

2.4 Roof Hatch Railing:

- 1. Bilco's roof hatch railing System: Bil-Guard 2.0.

2.5 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation.
 - 1. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils .
- B. Aluminum Extrusions and Tubes: ASTM B 221 , manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.
- C. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.
- D. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.

- E. Steel Tube: ASTM A 500/A 500M, round tube.
- F. Galvanized-Steel Tube: ASTM A 500/A 500M, round tube, hot-dip galvanized according to ASTM A 123/A 123M.
- G. Steel Pipe: ASTM A 53/A 53M, galvanized.

2.6 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, thickness and thermal resistivity as indicated.
- C. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, [containing no arsenic or chromium,] and complying with AWPA C2; not less than 1-1/2 inches thick.
- D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- E. Underlayment:
 - 1. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 - 2. Polyethylene Sheet: 6-mil-thick polyethylene sheet complying with ASTM D 4397.
 - 3. Slip Sheet: Building paper, 3 lb/100 sq. ft. minimum, rosin sized.
 - 4. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 5. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
 - 6. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
 - 7. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 8. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- G. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

- H. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
- I. Asphalt Roofing Cement: ASTM D 4586/D 4586M, asbestos free, of consistency required for application.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.
 - 1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
 - 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
 - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 - 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Roof Curb Installation: Install each roof curb so top surface is level.
- D. Roof-Hatch Installation:
1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
 2. Attach safety railing system to roof-hatch curb.
 3. Attach ladder-assist post according to manufacturer's written instructions.
- E. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780/A 780M.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting."
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Clean off excess sealants.
- E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

PART I - GENERAL

A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

- A. The Work of this Section shall include furnishing all labor, materials, equipment and services necessary for, and incidental to, the complete and proper installation of all spray-applied fire resistive materials, as indicated on the Drawings and as herein specified.
- B. The material and installation shall conform to the applicable building code requirements and the requirements of all authorities having jurisdiction.

A. The following Work is related to this Section:

1. Selective Demolition Section 02 4119

A. Comply with the requirements of the current edition of the specifications or standard listed, except where more stringent requirements are indicated on the Drawings or specified herein:

1. ASTM E84, Surface Burning Characteristics of Building Materials.
2. ASTM E119, Fire Tests of Building Construction and Materials.
3. ASTM E136, (Noncombustibility) Behavior of Materials in a Vertical Tube Furnace at 750° C.
4. ASTM E605, Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members.
5. ASTM E736, Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
6. ASTM E759, Effect of Deflection of Sprayed Fire-Resistive Materials Applied to Structural Members.
7. ASTM E760, Effect of Impact on the Bonding of Sprayed Fire-Resistive Materials Applied to Structural Members.

8. ASTM E761, Compressive Strength of Sprayed Fire-Resistive Materials Applied to Structural Members.
9. ASTM E859, Air Erosion of Sprayed Fire-Resistive Materials Applied to Structural Members.
10. ASTM E937, Corrosion of Steel by Sprayed Fire-Resistive Materials Applied to Structural Members.
11. ULC/CAN S101, Standard Methods of Fire Tests of Building Construction and Materials.
12. ULC/CAN S102, Steiner Tunnel Test.
13. ULC/CAN 4 - S114, Standard Test Method for Determination of Non-combustibility in Building Materials.
14. Underwriters Laboratories, Inc. (UL) Fire Resistance Directory.
15. Underwriters Laboratories of Canada (ULC) List of Equipment and Materials.
16. Uniform Building Code Standard No. 7-6 (current edition): Thickness and Density Determination for Spray-Applied Fire Protection.
17. AWCI Publication: Standard Practice for the Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials. Technical Manual 12-A; an annotated guide.

1.5 Quality Control

- A. Work shall be performed by a firm with expertise in the installation of fire protection or similar materials. This firm shall be licensed or otherwise approved by the spray-applied fire resistive material manufacturer.
- B. All fire protection systems to be applied over an existing paint system shall be tested for adhesion.
- C. The spray-applied fire resistive material shall be tested for thickness and density in accordance with one of the following procedures:
 1. ASTM E605 - Standard Test Method for Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members.
 2. AWCI - Inspection Procedure for Field-Applied Sprayed Fire-Resistive Materials, Technical Manual 12-A; an annotated guide.
 3. UBC Standard No. 7-6 - Thickness and Density Determination for Spray-Applied Fire Protection.

- D. Inspection shall be contracted for and paid by someone other than the fire protection applicator.

1.6 Submittals

- A. Submit for review and approval Manufacturer's specifications, including certification as may be required to show material compliance with Contract Documents.
- B. Submit for record "Material Safety Data Sheets" for all materials used.
- C. Submit for record certification of compliance with local and federal guidelines governing application.
- D. Submit for record verification that proper permits have been obtained for contemplated work.
- E. Submit for record test results of thickness test.
- F. Submit for record certification that the preparation and application of surfaces is in compliance with this specification and the Manufacturer's specification.
- G. Submit for record results of adhesion tests.

1.7 Environmental Requirements

- A. When the prevailing outdoor temperature at the building is less than 40° F (4° C), a minimum substrate and ambient temperature of 40° F (4° C) shall be maintained prior to, during and a minimum of 24 hours after application of the spray-applied fire resistive material.
- B. Contractor shall provide ventilation to allow proper drying of the spray-applied fire resistive material during and subsequent to its application.
- C. Ventilation shall not be less than 4 complete air exchanges per hour until the SFRM is fully cured. When spraying in enclosed areas such as basements, stairwells, shafts and small rooms, additional air exchanges may be necessary.
- D. Manufacturer and Contractor are required to confirm that all materials used in accordance with this Section conform to local, state, and federal environmental and workers' safety laws and regulations.
- E. It shall be the sole responsibility of the Contractor to provide any and all necessary containment to protect on site property from damage during operations.
- F. It shall also be the sole responsibility of the Contractor to meet all regulations regarding air quality emission standards, OSHA, NFPA, EPA and other governing law set by local, state and federal agencies.

1.8 Transportation and Handling

- A. Deliver materials to the project in manufacturer's unopened packages, fully identified as to trade name, type and other identifying data. Packaging shall bear the UL and ULC labels for fire hazard and fire-resistance classifications.
- B. Store materials above ground, in a dry location, protected from weather, moisture and areas of high humidity. Damaged packages found unsuitable for use should be rejected and removed from the project.

PART 2 - MATERIALS

2.1 Medium Density

- A. Approved materials are:
 - 1. CAFCO® BLAZE-SHIELD® HP, Isolatek International
 - 2. Monokote Z-106, W. R. Grace
 - 3. or Approved Equivalent
- B. When tested in accordance with ASTM E605, the material shall meet the minimum individual and average density values as listed in the appropriate UL/UC design or as required by the authority having jurisdiction, or shall have a minimum average of 22 pcf (352 kg/m³)
- C. Cohesion/Adhesion (bond strength): When tested in accordance with ASTM E736, the material applied over uncoated or galvanized steel shall have an average bond strength of 434 psf (20.8 kPa).
- D. Compressive Strength: When tested in accordance with ASTM E761, the material shall not deform more than 10 percent when subjected to a crushing force of 7,344 psf (351 kPa).
- E. All other test criteria shall be in accordance with the values listed under Section 2.1.

PART 3 - EXECUTION

3.1 General

- A. Inspect surfaces to which fire protection will be applied and report immediately in writing to the Engineer as required in the General Conditions any conditions detrimental to the proper execution of this work.
- B. Do not proceed until unsatisfactory conditions are acceptably remedied. Commencement of work implies acceptance of related work.
- C. Before commencing work, make certain that the surface is in proper condition to receive coating system, that surfaces are clean, dry, and at proper temperature as recommended by Manufacturer.
- D. Provide adequate ventilation so that life or property is not endangered.
- E. Protect all adjacent surfaces from overspray.

3.2 Preparation

- A. All surfaces to receive fire protection shall be free of oil, grease, loose mill scale, dirt, or other foreign materials, which would impair satisfactory bonding to the surface. Preparation shall be accordance with Manufacturer.
- B. Existing steel surfaces are primed. Adhesion test shall be performed on existing steel. If adhesion test fails, steel surfaces shall be roughened and re-tested. Corroded steel surfaces shall be abrasive blast cleaned in accordance with Steel Structures Painting Council surface preparation specification SSPC SP6, Commercial Blast Clean. Manufacturer shall also be contacted for procedures on handling primed/painted steel.
- C. Clips, hangers, supports, sleeves and other attachments to the substrate are to be placed by others prior to the application of spray-applied fire resistive materials.
- D. The installation of piping, conduit or other suspended equipment shall not take place until the application of sprayed fire protection is complete in an area.
- E. The application of spray-applied fire resistive material shall not commence until certification has been received by the General Contractor that surfaces to receive sprayed fire protection have been inspected by the applicator and are acceptable to receive sprayed fire protection.
- F. All unsuitable substrates must be identified and made known to the General Contractor and corrected prior to the application of the spray-applied fire resistive material.
- G. Fire protection shall not be applied to steel prior to the completion of concrete work above.
- H. Provide masking, drop cloths or other suitable coverings to prevent overspray from coming in contact with surfaces not intended to be sprayed.

3.3 Application

- A. Equipment, mixing and application shall be in accordance with the manufacturer's written application instructions.
- B. Proper temperature and ventilation shall be maintained.
- C. Bonding materials (adhesives, catch coats, metal lath, mesh, stud pins, etc.) shall be applied as per the appropriate UL/ULC fire resistance design and manufacturer's written recommendations.
- D. Topcoat material, if any, shall be the type recommended and approved by the manufacturer of each spray-applied fire resistive material required for the applications indicated.

3.4 Repair and Cleaning

- A. All damage to the fire protection by other trades shall be repaired.

- B. After the completion of the work in this section, equipment shall be removed and all surfaces not to be sprayed shall be cleaned.

END OF SECTION

SECTION 07 9200 – JOINT SEALANTS

PART 1 - GENERAL

1.1 Related Documents

- A. Conditions of Contract for Construction and General Requirements of Division 1 of these Specifications apply to Work in this Section.

1.2 Work Included

- A. Work of this Section shall include furnishing all labor, materials, equipment, and supervision to install joint sealants, including surface preparation.
- B. Work included by joint sealant Installer shall include deck coatings specified in Section 07 1800, Traffic Coatings and Section 07 1900, Water Repellents.

1.3 Related Work

- A. Following Work is related to this Section:

1.	Concrete Repair	Section 03 0130
2.	Cast-in-Place Concrete	Section 03 3000
3.	Masonry Restoration & Cleaning	Section 04 0100
4.	Traffic Coatings	Section 07 1800
5.	Pavement Markings	Section 32 1723

1.4 Quality Control

- A. General
 - 1. Joint sealant Installer shall be approved by joint sealant Manufacturer.
 - 2. Joint sealant Installer shall have a minimum of five (5) years experience in application of one of approved joint sealant systems and have experience for a project in size of 5,000 LF or greater.
 - 3. Manufacturer shall make available a qualified Representative to assist Installer and Engineer as specified herein. Representative shall be experienced in placement of sealant material.
- B. Testing Requirements

1. Installer to perform adhesion test in presence of Engineer at rate of one test per 1,000 lineal feet of joint. Adhesion test to be performed a minimum of 7 days after installation. Procedure per Manufacturer's standard or as follows:
 - a. Make a knife cut from one side of joint to other.
 - b. Make two cuts approximately two inches long at sides of joint, meeting first cut at top of two-inch cuts.
 - c. Grasp two-inch piece of sealant and try to pull uncut sealant out of joint.
 - d. If adhesion is adequate, sealant should tear cohesively in itself or be very difficult to adhesively remove from surface.
 - e. Sealant shall be replaced by applying more sealant in same manner as original.
2. If test results are unsatisfactory, more frequent testing will be required until satisfactory results are consistently obtained.
3. Replace all sealant which proves defective per above test at no additional cost to Owner.

1.5 Submittals

A. Action Submittals:

1. Manufacturer's Spec Data Sheets of each product to be used.
2. Complete description of the joint sealant system including primer, sealant material, and backer rods or bond breakers. Also indicate placement and installation procedures along with material working requirements, shelf life, and performance data.
3. Qualification statement of Installer stating projects, size and location.
4. Sample Warranty prior to application.

B. Informational Submittals:

1. Sequence of sealant placement in structure. The sealant installation shall be coordinated to allow required minimum concrete cure times.
2. Material Safety Data Sheets of each product, solvent, or related chemicals to be used and certification that materials conform to local, state and federal environmental and worker's safety laws and regulations.
3. Certification that joint sealant system is compatible with all products in Divisions 3, 7, and 9 to which it will come in contact.

1.6 Environmental Requirements

- ### **A. Manufacturer and Installer are required to confirm that all materials used in accordance with this Section conform to local, state, and federal environmental and workers' safety laws and regulations.**
1. VOC content of materials shall not exceed the limits per Environmental Protection Agency National Volatile Organic Compound Emission Standards for Architectural Coatings (40CFR59).

1.7 Transportation and Handling

- A. Deliver all materials to site in original, unopened containers, bearing following information:
 - 1. Name of product
 - 2. Name of Manufacturer
 - 3. Date of manufacture
 - 4. Lot or batch number
 - 5. UL labels
- B. Store materials under cover and protected from weather, within Manufacturer's recommended temperature ranges.
- C. Replace packages or materials indicating any signs of damage with new material at no additional cost to Owner.
- D. At no time shall the weight of stored material placed on a slab area exceed 30 PSF or 2,000 lbs. over 20 square inches.

1.8 Warranty

- A. Provide to Owner a Warranty by Installer and Manufacturer that joint sealant system will be free of defects, water penetration, and chemical damage related to design, workmanship, or material deficiency, consisting of, but not limited to:
 - 1. Surface crazing or other weathering deficiency.
 - 2. Abrasion or tear failure resulting from normal traffic use.
 - 3. Tear failure resulting from anticipated movement.
 - 4. Debonding from substrate or delaminating between layers.
 - 5. Defective installation.
- B. Warranty shall be "Joint and Several" in which Installer and Manufacturer will jointly and severally warrant and provide at no charge to Owner materials and labor needed to properly repair or replace product and replace parking stripes within duration of Warranty. In event of either party's non-performance, full burden and responsibility for any Warranty repair shall fall upon remaining party.
- C. Normal traffic is considered to include snow removal equipment with rubber tipped blades as described in the National Parking Association publication, *Parking Garage Maintenance Manual*.
- D. Vandalism, abrasive maintenance equipment, and construction traffic are not normal traffic use and are exempt from Warranty.

1.9 Warranty Duration

- A. Bid price shall include a five (5) year Warranty commencing with date of project acceptance in accordance with General Conditions.
- B. Although completed areas of facility may be opened to traffic and parking, commencement of Warranty period will not occur prior to acceptance of entire project.
- C. A single Warranty commencement date will apply to all waterproofing.

1.10 Basis of Payment

- A. Cove sealants, crack sealants, control joint sealants, and capstone joint sealants will be paid on a unit price or lump sum basis. Refer to Bid Form.
- B. Joint widening or other necessary modifications shall be incidental to system cost.

PART 2 - PRODUCTS

2.1 Joint Sealant System - Polyurethane

- A. Horizontal Joint Sealant (except cove joints and capstone joints)
 - 1. Traffic-bearing, multi-component, self-leveling or non-sag unmodified polyurethane sealant, gray in color unless noted otherwise, containing no coal tar, asphalt, or other adulterants and conforming to ASTM C 920, Standard Specification for Elastomeric Joint Sealants, Type M, Grade P or NS, Class 25, use T and Federal Specification TT-S-00227, Type I or II, Class A.
 - 2. On slopes greater than 2%, slope grade versions of specified self-leveling sealants or non-sag sealants, as specified for vertical and cove joint sealants, are to be used per Manufacturer's recommendations.
 - 3. Approved Horizontal Joint Sealants are:
 - a. Iso-Flex 880GB or 881, LymTal International, Inc., Orion, MI.
 - b. Urexpam NR-200 or Dynatred, Pecora Corp., Harleysville, PA.
 - c. Sikaflex - 2c NS/SL, Sika Corp., Lyndhurst, NJ.
 - d. MasterSeal SL2, Sonneborn Building Products, BASF Building Systems, Shakopee, MN.
 - e. THC 900 or THC 901, Tremco Inc., Cleveland, OH.
 - f. Vulkem 445SSL, Tremco Inc., Cleveland, OH.
- B. Vertical and Cove Joint Sealants
 - 1. Multi-component, non-sag unmodified polyurethane sealant, gray in color unless otherwise noted, containing no coal tar, asphalt, or other adulterants and conforming to ASTM C 920, Type M, Grade NS, Class 25, use NT and Federal Specification TT-S-00227E, Type II, Class A.
 - 2. Approved Vertical and Cove Joint Sealants are:

- a. ISO-FLEX 881, LymTal International, Inc., Orion, MI.
- b. Dynatrol II, Pecora Corp., Harleysville, PA.
- c. Sikaflex - 2c NS, Sika Corp., Lyndhurst, NJ.
- d. MasterSeal NP2, Sonneborn Building Products, BASF Building Systems, Shakopee, MN.
- e. Dymeric 240 FC, Tremco Inc., Cleveland, OH.
- f. Vulkem 116, Tremco, Inc., Cleveland, OH.

2.2 Joint Sealant System - Silicone

A. Capstone Joint Sealant

1. One component, non-sag silicone sealant, gray in color unless otherwise noted.
2. Approved Capstone Joint Sealants are:
 - a. Dow NS Parking Structure Sealant, Dow Corning, Corp., Midland, MI.
 - b. Spectrum 800, Tremco Inc., Cleveland, OH.
 - c. Sikasil 728 NS, Sika Corp, Lyndhurst, NJ.

2.3 Joint Sealant System - Fire Rated Joint

- A. Fire rated joint sealant systems shall meet fire rating as indicated on Drawings.
- B. Fire rated joint sealant systems shall prevent passage of flame or hot gasses and stop transmission of heat per ASTM E 119 and UL 263.
- C. Approved Fire Rated Joint Sealant Systems as provided by following suppliers:
 1. LymTal International, Inc., Orion, MI.
 2. Pecora Corp., Harleysville, PA.
 3. Sika Corp., Lyndhurst, NJ.
 4. Sonneborn Building Products, BASF Building Systems, Shakopee, MN.
 5. Tremco Inc., Cleveland, OH.

2.4 Backer Rod

- A. Backer rod diameter shall be as recommended by Manufacturer for joint sizes indicated on Drawings.
- B. Backer rod shall be extruded round, closed cell or bi-cellular, low-density polyethylene or polyolefin foam material with a skin-like outer texture.
- C. Approved closed cell backer rods are:
 1. Mile High Foam Backer Rod, Backer Rod Manufacturing, Inc., Denver, CO.
 2. ITP Standard Backer Rod Insulation, Industrial Thermo Polymers Limited, Buffalo, NY.

3. HBR, Nomaco, Inc., Zebulon, NC.
4. MasterSeal 920 Closed-Cell Backer-Rod, BASF Building Systems, Shakopee, MN.

D. Approved bi-cellular backer rods are:

1. ITP Soft-Type Backer Rod, Industrial Thermo Polymers Limited, Buffalo, NY.
2. SOF Rod, Nomaco, Inc., Zebulon, NC.
3. MasterSeal 921 Soft Backer-Rod, BASF Building Systems, Shakopee, MN.

PART 3 - EXECUTION

3.1 Inspection

- A. Inspect surfaces to receive Work and report immediately in writing to Engineer as required in General Conditions any deficiencies in surface which render it unsuitable for proper execution of this Work. Do not proceed with Work until unsatisfactory conditions have been corrected in an acceptable manner. Commencement of Work implies acceptance of related Work.

3.2 General

- A. Coordinate and verify that related Work meets following requirements.
 1. Concrete surfaces are finished, cleaned and prepped, as specified by Manufacturer for system to be installed.
 2. Curing compounds used on concrete surfaces are compatible with Work to be installed.
 3. Systems selected for use are compatible with each other.
- B. Installer shall take necessary precautions against injury to personnel or adjacent building occupants during installation of joint sealants. Installer personnel shall use protective equipment and area shall be well vented to outside.

3.3 Preparation

- A. Grind joint edges smooth and straight prior to installation.
- B. All surfaces that are to receive joint sealant shall be dry and thoroughly cleaned by mechanical means of all loose particles, existing joint sealant, laitance, dirt, dust, oil, grease or other foreign matter. Mechanical methods, such as grinding or sandblasting, shall be used to clean joint surfaces to sound, virgin concrete.
- C. Check preparation of substrate to ensure adhesion of joint sealant.
- D. Correct unsatisfactory conditions in a manner acceptable to Manufacturer and Engineer before installation of joint sealant system.

- E. Rout cracks with a grinding tool to produce the profile indicated on Drawings. Crack must be centered in the routed notch.

3.4 Installation/Application

- A. Do all Work in strict accordance with Manufacturer's written instructions and specifications and as indicated on Drawings.
- B. Do not apply joint sealant system until concrete has been air dried at temperatures at or above 40 degrees F. for at least 28 days after curing period specified in Section 03 3000, Cast-In-Place Concrete, Section 03 0130, Concrete Repair, or as otherwise approved by Manufacturer.
- C. Install bond breaker or backer rod as indicated on Drawings.
- D. Prime all joints and cracks.
- E. Completely fill joint with sealant, without sagging or smearing onto adjacent surfaces.
- F. In areas not receiving deck coating, fill horizontal joints and cracks until slightly recessed to avoid direct contact with wheel traffic.
- G. Cease installation under adverse weather conditions, or when temperatures are below 40 degrees F or below or above Manufacturer's recommended limitations.
- H. Protect joint sealant as required until sealant is fully cured.

3.5 Cleanup

- A. Remove all excess primer, sealant, and masking materials from structure.

END OF SECTION 07 9200

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

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 hollow-metal work for doors and frames
- B. Related Requirements:
 - 1. Section 01 25 00 "Substitution Procedures" for substitutions requirements.
 - 2. Section 04 20 00 "Unit Masonry" for grouting frames in masonry.
 - 3. Section 08 16 50 "Composite Entry Doors" for pre-hung entrance door frames.
 - 4. Section 08 71 00 "Door Hardware" for door hardware for hollow-metal doors.
 - 5.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door type.

2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 4. Locations of reinforcement and preparations for hardware.
 5. Details of each different wall opening condition.
 6. Details of anchorages, joints, field splices, and connections.
 7. Details of accessories.
 8. Details of moldings, removable stops, and glazing.
 9. Details of conduit and preparations for power, signal, and control systems.
- C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Curries Company; an Assa Abloy Group company.
 2. Republic Doors and Frames.
 3. Steelcraft; an Ingersoll-Rand company.
 4. Substitutions per section 01 25 00.
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

2.3 INTERIOR DOORS AND FRAMES

- A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2. Typical Interior door and frame.
 - 1. Physical Performance: Level B according to SDI A250.4.
 - 2. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches (44.5 mm).
 - c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch (1.0 mm).
 - d. Edge Construction: Model 1, Full Flush.
 - e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.
 - f. Door lites: Provide 100 sq. inch door lites in all stairway doors
 - 3. Frames:
 - a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
 - b. Construction: Knocked down.
 - 4. Exposed Finish: Prime.

2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

- A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3. All exterior doors and frames.
 - 1. Physical Performance: Level A according to SDI A250.4.
 - 2. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches (44.5 mm.)

- c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A40 (ZF120) coating.
 - d. Edge Construction: Model 1, Full Flush.
 - e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.
 - f. Core: Mineral board.
- 1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu (0.370 K x sq. m/W) when tested according to ASTM C 1363.

3. Frames:

- a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A40 (ZF120) coating.
- b. Construction: Knocked down.

4. Exposed Finish: Prime.

2.5 FRAME ANCHORS

A. Jamb Anchors:

- 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (51 mm) wide by 10 inches (254 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
- 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
- 3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.

2.6 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
 - B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
 - C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
 - D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- I. Glazing: Comply with requirements in Section 088000 "Glazing."
- J. Grout Materials: Grout hollow metal frames solid with Isolatek CAFCO 300.
- K. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.7 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Doors:
 - 1. Vertical Edges for Single-Acting Doors: Provide beveled or square edges at manufacturer's discretion.
 - 2. Top Edge Closures: Close top edges of doors with inverted closures of same material as face sheets.
 - 3. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.
 - 4. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
- C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.

2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 16 inches (406 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c., to match coursing, and as follows:
 - 1) Two anchors per jamb up to 60 inches (1524 mm) high.
 - 2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
 - 3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches (1524 mm) high.
 - 2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
 - 3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
 - c. Compression Type: Not less than two anchors in each frame.
4. Head Anchors: Two anchors per head for frames more than 42 inches (1067 mm) wide and mounted in metal-stud partitions.
5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with [butted] [or] [mitered] hairline joints.
 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.

2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow-metal work.
5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.8 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

- B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install door silencers in frames before grouting.
 - d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - f. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
 2. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or spray applied fire proofing.
 4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
- C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Steel Doors:
 - a. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
 - b. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm) to 1/4 inch (6.3 mm) plus or minus 1/32 inch (0.8 mm).
 - c. At Bottom of Door: [3/4 inch (19.1 mm)] [5/8 inch (15.8 mm)] plus or minus 1/32 inch (0.8 mm).
 - d. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

- D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

- 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

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END OF SECTION 081113

SECTION 086200 - UNIT SKYLIGHTS

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. Unit skylights mounted on prefabricated curbs.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of unit skylight.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for unit skylights.
 - 2. Motors: Show nameplate data, power requirements, ratings, characteristics, and mounting arrangements.
- B. Shop Drawings: For unit skylight work.
 - 1. Include plans, elevations, sections, details, and connections to supporting structure and other adjoining work.
 - 2. Multiple Units: Methods of connection and structural support for multiple units clustered together.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating unit skylights that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.
- B. Installer Qualifications: An installer acceptable to unit skylight manufacturer for installation of units required for this Project.

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of unit skylights that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Uncontrolled water leakage.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - c. Yellowing of acrylic glazing.
 - d. Breakage of polycarbonate glazing.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Wasco's ESS2 3652

2.2 PERFORMANCE REQUIREMENTS

- A. Unit Skylight Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 1. Performance Class and Grade: Class CW-PG 50.
 2. Certification: AAMA-, WDMA-, or CSA-certified unit skylights with label attached to each.

2.3 UNIT SKYLIGHTS

- A. General: Provide factory-assembled unit skylights that include glazing, extruded-aluminum glazing retainers, gaskets, and inner frames and that are capable of withstanding performance requirements indicated.
- B. Acrylic Glazing: ASTM D 4802, thermoformable, monolithic sheet, category as standard with manufacturer, Finish 1 (smooth or polished), Type UVF (formulated with UV absorber).
 1. Double-Glazing Profile: Dome, 25 percent rise.
 - a. Thicknesses: Not less than thicknesses required to exceed performance requirements.
 - b. Outer Glazing Color: Gray tinted, transparent.
 - c. Inner Glazing Color: Colorless, transparent.
 2. Self-Ignition Temperature: 650 deg F or more for plastic sheets in thickness indicated when tested according to ASTM D 1929.
 3. Smoke-Production Characteristics: Smoke-developed index of 450 or less when tested according to ASTM E 84, and smoke density of 75 or less when tested according to ASTM D 2843

4. Burning Characteristics: Tested according to ASTM D 635. Class CC2, burning rate of 2-1/2 inches per minute or less for nominal thickness of 0.060 inch or thickness indicated for use.
- C. Polycarbonate Glazing: Thermoformable, extruded monolithic sheets, UV resistant, burglar-resistance rated according to UL 972, and with average impact strength of 12 to 16 ft-lb/in. of width when tested according to ASTM D 256, Test Method A (Izod).
 1. Self-Ignition Temperature: 650 deg F or more for plastic sheets in thickness indicated when tested according to ASTM D 1929.
 2. Smoke-Production Characteristics: Smoke-developed index of 450 or less when tested according to ASTM E 84, and smoke density of 75 or less when tested according to ASTM D 2843
 3. Burning Characteristics: Tested according to ASTM D 635. Class CC1, burning extent of 1 inch or less for nominal thickness of 0.060 inch or thickness indicated for use.
- D. Glazing Gaskets: Manufacturer's standard.
- E. Prefabricated Curb: As specified in Section 077200 "Roof Accessories."
- F. Thermal Break: Fabricate unit skylights with thermal barrier separating exterior and interior metal framing.

2.4 ACCESSORY MATERIALS

- A. Fasteners: Same metal as metal being fastened, nonmagnetic stainless steel, or other noncorrosive metal as recommended by manufacturer. Finish exposed fasteners to match material being fastened.
 1. Where removal of exterior exposed fasteners might allow access to building, provide nonremovable fastener heads.
- B. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat.
- C. Prefabricated Curbs: Wasco's WRC3 (16" tall), Aluminum finish, thermally broken and insulated.

2.5 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 1. Color and Gloss: As indicated by manufacturer's designations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Coordinate installation of unit skylight with installation of substrates, vapor retarders, roof insulation, roofing membrane, and flashing as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight.
- B. Comply with recommendations in AAMA 1607 and with manufacturer's written instructions for installing unit skylights.
- C. Install unit skylights level, plumb, and true to line, without distortion.
- D. Anchor unit skylights securely to supporting substrates.
- E. Where aluminum surfaces of unit skylights will contact another metal or corrosive substrates, such as preservative-treated wood, apply bituminous coating on concealed metal surfaces or provide other approved permanent separation recommended in writing by unit skylight manufacturer.

3.3 CLEANING

- A. Clean exposed unit skylight surfaces according to manufacturer's written instructions. Touch up damaged metal coatings and finishes.
- B. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Remove and replace glazing that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect unit skylight surfaces from contact with contaminating substances resulting from construction operations.

END OF SECTION 086200

SECTION 09 91 13 - EXTERIOR PAINTING

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 surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Steel.
 - 2. Galvanized metal.
 - 3. Wood.
 - 4. Pavement Marking Paint.
- B. Related Requirements:
 - 1. Section 09 91 23 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- D. Colors: Match Architect's samples.

2.2 PRIMERS/SEALERS

- A. Primer, Bonding, Water Based: MPI #17.
- B. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

2.3 METAL PRIMERS

- A. Primer, Galvanized: As recommended in writing by topcoat manufacturer.

2.4 WOOD PRIMERS

- A. Primer, Alkyd for Exterior Wood: MPI #5.

2.5 WATER-BASED PAINTS

- A. Latex, Exterior Flat (Gloss Level 1): MPI #10.
- B. Latex, Exterior Semi-Gloss (Gloss Level 5): MPI #11.
- C. Latex, Exterior, Gloss (Gloss Level 6: MPI #119.

2.6 SOLVENT-BASED PAINTS

- A. Alkyd, Exterior Flat (Gloss Level 1): MPI #8.
- B. Alkyd, Exterior, Semi-Gloss (Gloss Level 5): MPI #94.
- C. Alkyd, Exterior Gloss (Gloss Level 6): MPI #9.

2.7 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Wood: 15 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

G. Wood Substrates:

1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

H. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed to view:
 - a. Equipment, including panelboards and switch gear.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing

and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. Steel Substrates:
 - 1. Alkyd System:
 - a. Prime Coat: Primer, alkyd, anticorrosive for metal, MPI #79.
 - b. Prime Coat: Shop primer specified in Section 051200 "Structural Steel Framing" where substrate is specified.
 - c. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - d. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5), MPI #94.
- B. Galvanized-Metal Substrates:
 - 1. Alkyd System:
 - a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5), MPI #94.
- C. Wood Substrates: Including wood trim.
 - 1. Latex over Alkyd Primer System:
 - a. Prime Coat: Primer, alkyd for exterior wood, MPI #5.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4), MPI #15.

D. Pavement Marking Paint:

1. Sherwin Williams' Hotline Fast Dry Latex Traffic Marking Paint.

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END OF SECTION 09 91 13

SECTION 09 91 23 - INTERIOR PAINTING

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 surface preparation and the application of paint systems on the following interior substrates:
 - 1. Concrete.
 - 2. Concrete masonry units (CMU).
 - 3. Steel.
 - 4. Wood.
 - 5. Gypsum board.
- B. Related Requirements:
 - 1. Section 05 12 00 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.
 - 2. Section 09 91 13 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F .
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F .
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Refer to Interior Design Drawings, Interior Finish Legend and Interior Finish Schedule for product information.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 3, "Power Tool Cleaning."

- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards.
 - 2. Paint the following work where exposed in occupied spaces:
 - a. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. Refer to Interior Design Drawings, Interior Finish Legend and Interior Finish Schedule.
- B. Concrete Substrates, Nontraffic Surfaces:
 1. Latex System:
 - a. Prime Coat: Primer sealer, latex, interior.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, (Gloss Level 3).
- C. CMU Substrates:
 1. Latex System:
 - a. Block Filler: Block filler, latex, interior/exterior.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, (Gloss Level 3).

2. Alkyd System:

- a. Block Filler: Block filler, latex, interior/exterior.
- b. Sealer Coat: Primer sealer, latex, interior.
- c. Intermediate Coat: Alkyd, interior, matching topcoat.
- d. Topcoat: Alkyd, interior, (Gloss Level 3).

D. Steel Substrates:

1. Latex over Alkyd Primer System:

- a. Prime Coat: Primer, alkyd, anti-corrosive, for metal.
- b. Prime Coat: Primer, alkyd, quick dry, for metal.
- c. Prime Coat: Primer, alkyd, anti-corrosive, for metal or primer, alkyd, quick dry, for metal.
- d. Prime Coat: Shop primer specified in Section where substrate is specified.
- e. Intermediate Coat: Latex, interior, matching topcoat.
- f. Topcoat: Latex, interior, (Gloss Level 3).

E. Wood Substrates: Including wood trim, architectural woodwork, and doors.

1. Latex System:

- a. Prime Coat: Primer, latex, for interior wood.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, (Gloss Level 3).
- d.).

F. Gypsum Board Substrates:

1. Latex System:

- a. Prime Coat: Primer sealer, latex, interior.
- b. Prime Coat: Latex, interior, matching topcoat.
- c. Intermediate Coat: Latex, interior, matching topcoat.
- d. Topcoat: Latex, interior, (Gloss Level 3).

G. Pipe and duct coverings.

1. Latex System:

- a. Prime Coat: Primer sealer, latex, interior.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, (Gloss Level 3).

2. Institutional Low-Odor/VOC Latex System:

- a. Prime Coat: Primer sealer, latex, interior.
- b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
- c. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3).

3. Alkyd over Latex Primer System:
 - a. Prime Coat: Primer sealer, latex, interior.
 - b. Intermediate Coat: Alkyd, interior, matching topcoat.
 - c. Topcoat: Alkyd, interior, (Gloss Level 3).
4. Aluminum Paint System:
 - a. Prime Coat: Primer sealer, latex, interior.
 - b. Intermediate Coat: Aluminum paint.
 - c. Topcoat: Aluminum paint.

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END OF SECTION 09 91 23

SECTION 220000 - MECHANICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 INSTRUCTIONS AND TERMS:

- A. All pertinent conditions of the Bidding Requirements, Conditions of the Contract and General Requirements shall govern work under this and all Division 22 sections.
- B. All materials of a given type shall be manufactured by a single source, and supplied by a single supplier.

1.2 SCOPE OF WORK:

- A. Refer to mechanical scope in Summary of Work

1.3 INTERPRETATION OF DRAWINGS:

- A. The Drawings show the location and general arrangement of equipment, piping, ductwork and related items. They shall be followed as closely as elements of the construction will permit. Examine the drawings of other trades and verify the conditions governing the work on the job site. Drawings are schematic in nature, and installation may require additional offsets and modifications, including fittings, traps, valves and accessories.
- B. The architectural and structural drawings take precedence in all matters pertaining to the building structure, mechanical drawings in all matters pertaining to mechanical trades and electrical drawings in all matters pertaining to electrical trades. Report conflicts or differences to the architect/ engineer for resolution.

1.4 PROJECT RECORD DOCUMENTS:

- A. For underground piping, record dimensions and invert elevations of all piping, including all offsets, fittings, cathodic protection and accessories. Locate dimensions from benchmarks that will be preserved after construction is complete.
- B. For fire protection systems, record actual locations of sprinkler heads, and valves and deviations of piping from drawings. Indicate drain and test locations.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. Deliver, store and handle all materials to keep clean and protected from damage.
- B. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

- C. Protect equipment and other materials from damage after installed from construction debris and other damage.

1.6 QUALITY ASSURANCE:

- A. Regulatory Requirements: Comply with the following:
 - 1. State Mechanical Code.
 - 2. State Plumbing Code.
- B. Labeling requirement for packaged equipment:
 - 1. Electrical panels on packaged mechanical equipment shall bear UL label or label of other approved testing agency (ETL, CSA).
- C. Other referenced standards:
 - 1. Comply with referenced standards, guidelines, data sheets from various associations, including NFPA, ANSI, ASTM, ASME, ASHRAE
- D. All equipment and component performance information for the heating, ventilating and air conditioning systems must be designed and installed for the efficient utilization of energy in accordance with the State Energy Conservation Code.
- E. All mechanical equipment must bear the label of an approved agency. In addition to the provisions established in the codes for specific mechanical equipment, all equipment must be installed in accordance with the information on the label and the manufacturer's installation instructions, which must be available at the job site. Provide these specifications accordingly. The equipment must also comply with the applicable standards referenced in the codes. Final approval of the mechanical equipment installations shall be subject to the code official.
- F. Material exposed within the plenum is either non combustible or has a maximum flame spread index of 25 and a maximum smoke-developed index of 50. (602.2.1)

PART 2 - PRODUCTS

2.1 FIRE STOPPING:

- A. Provide UL classified firestopping system for mechanical penetrations through rated walls and floors to maintain the fire rating. Completely fire stop all duct openings between the First and Second Floor.

Manufacturers: TREMCO Fyrshield, Manville Duxseal, 3M

2.2 ACCESS PANELS:

- A. Furnish access panels to access valves, traps, control valves or devices, dampers, damper motors, etc. Access panels shall be sized as necessary for ample access, or as indicated on drawings, but no smaller than 12" x 12" where devices are within easy reach of operator, and at least 24"x24" when operator must pass through opening in order to reach the devices. Architectural Trades shall install access panels coordinated with Mechanical Trades.
- B. Access panels in fire rated walls or ceiling must be U.L. labeled for intended use. Unless otherwise indicated on plans, access doors shall be hinged flush type steel framed panel, 14 gauge minimum for frame, and with anchor straps. Only narrow border shall be exposed. Hinges shall be concealed type. Locking device shall be flush type and screw driver operated. Metal surfaces shall be prime coated with rust-inhibitive paint. Panels shall be compatible with architectural adjacent materials Manufacturer: Milcor, Bilco

2.3 BELT DRIVES:

- A. Provide V style motor pulleys, belts and driven sheaves in compliance with Rubber Manufacturers Association (RMA) standards, and as specified herein.
- B. Pulleys and sheaves shall be fixed pitch for motors 5 HP and larger, statically and dynamically balanced, and shall be adjustable pitch for motor smaller than 5 HP.
- C. All drive systems shall be rated for rated motor horsepower, with a service factor of 1.2.
- D. For multiple belt drives, match belts as a set. Groove spacing for motor pulley and equipment sheave shall align.
- E. Replace belts, pulleys and sheaves to attain specified equipment performance. Coordinate work with test and balance contractor.
- F. Minimum V-belt sheave diameter shall comply with RMA recommendations.
- G. Provide OSHA approved belt guard for all belt driven equipment. Coordinate with equipment supplier. Guard shall include 1" tachometer access hole

2.4 PIPE FLASHING SYSTEM:

- A. Provide RPS-Pipe Portals as manufactured by Roof Products & Systems Corporation, ThyCurb or Pate for all piping and conduit penetrating the roof. The pipe portals shall include a 12" OD prefabricated roof curb (single or multiple as required), a laminated acrylic coated ABS plastic curb cover with pre-punched mounting holes and molded sealing ring on the 8" collared opening, and an EPDM (Ethylene Propylene Hydrocarbon) compression molded rubber cap to mate pipe. The caps shall include stainless steel clamps.

- B. Companion prefabricated 12" high roof curbs shall be of box section design, 18 gauge galvanized steel with continuous welded corner seams (heavy gauge aluminum), factory installed wood nailer, and shall be insulated with 1-1/2", 3 lb. density, rigid fiberglass board. Provide roof curbs with built-in cant to mate roof insulation thickness above base plate, extended to full mitered corners.

2.5 EQUIPMENT RAILS:

- A. Equipment mounting rails shall be 12" high RSP Model ER-4A as manufactured by Roof Products and Systems Corporation, ThyCurb or Pate. Construction shall be 18 gauge, galvanized steel, monolithic construction, with integral base plate, continuous welded corner seams, factory installed 2 x 6 wood nailer, and including an 18 gauge galvanized steel counter-flashing complete with screws. Fill interiors with insulation at factory. Provide built-in raised cant to mate roof insulation extended to full mitered corners.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS:

- A. Install equipment and materials in accordance with manufacturer's written and illustrated instructions, as detailed on drawings and as described in these specifications. Bring discrepancies in installation methods to the attention of the owner and A/E.
- B. Install hanger rod straight, without bending.

3.2 REFRIGERANT HANDLING

- A. Refrigerant Installation: Perform all work related to refrigerant contained in, cooling coils, air conditioners, and similar equipment, including related piping, in strict accordance with the following requirements:
 - 1. ASHRAE Standard 15 and Related Revisions: Safety Code for Mechanical Refrigeration.
 - 2. ASHRAE Standard 34 and Related Revisions: Number Designation and Safety Classification of Refrigerants.
 - 3. United States Environmental Protection Agency (US EPA) requirements of Section 808 (Prohibition of Venting and Regulation of CFC) and applicable State and local regulations of authorities having jurisdiction.

END OF SECTION 220000

SECTION 220010 - BASIC PIPING MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SCOPE OF WORK:

- A. This Section specifies piping materials and installation methods common to more than one section of Division 22 and includes joining materials, piping specialties, and basic piping installation instructions.

1.2 QUALITY ASSURANCE:

- A. All steam piping above 15 psig, and all condensate piping shall comply with ANSI Standard B31.1 - Power Piping, except as noted herein.
- B. All building service piping (including pressurized piping, vacuum), shall comply with ANSI Standard B31.9 - Building Service Piping, unless noted otherwise.

PART 2 - PRODUCTS

2.1 GENERAL PIPING REQUIREMENTS:

- A. All piping materials shall be compatible for temperature, pressure and service.
- B. All piping materials of a given type shall be manufactured by a single source, and supplied by a single supplier.

2.2 PLUMBING PIPING SYSTEMS:

- A. Cold Water, Hot Water and Hot Water Return - Above Ground:
 - 1. Up to 4" ASTM B88, Type L, seamless hard drawn rigid copper water tube. Fittings: ANSI B16.22, wrought copper, ASTM B32-95TA solder joint up to 2" brazed joints above 2" or Pro-Press joints.
 - 2. Or up to 2": Flexible cross-linked polyethylene (PEX) tubing furnished, manufactured and listed in accordance with ASTM F876 and F877. Provide fitting in accordance with ASTM F877 and F1960.

3. Or all sizes Polypropylene Pipe by Aquatherm Green Pipe: ASTM F 2389, pipe pressure rating shall comply with temperature and pressure ratings per the plumbing code requirements for the applicable service (water distribution, water service. Polypropylene Fittings: ASTM F 2389, socket fusion, butt fusion, electrofusion, or fusion outlet fittings shall be used for fusion weld joints between pipe and fittings. Fittings and transition fittings shall be used where transitions are made to other piping materials or to valves and appurtenances. Polypropylene pipe shall not be threaded. Threaded transition fittings per ASTM F 2389 shall be used where a threaded connection is required.
- B. Cold Water - Under Ground:
1. For piping through 4"
Pipe: Type K Copper, hard drawn, ASTM B 88
Fittings: Wrought Copper, ANSI B16.22
Joints: Provide continuous Copper tubing with no joints.
 2. For piping 5" and larger:
Pipe: Ductile Iron, AWWA C115 or AWWA C151 with C104 cement mortar lining.
Fittings: AWWA C110 or AWWA C153, 150 psi rating with C104 cement mortar lining
Joints: AWWA C111 rubber gaskets.
- C. Natural Gas - Above Ground:
1. For piping through 2":
Pipe: Black Steel, Schedule 40, ASTM A 53, ERW or seamless, grade B
Fittings: Malleable iron, 150 lb. ASTM A 197; unions, 250 lb. ASTM A 197
Joints: Screwed Terminal connections 1/2" and less: Type L Copper, annealed, ASTM B 88, 24" maximum length, flared connections
 2. For piping 2-1/2" and larger
Pipe: Black Steel, Schedule 40, ASTM A 53, ERW or seamless, grade B, standard weight for 12" and above
Fittings: Standard weight, butt welded, black steel, ASTM A 234
Joints: Welded. Flanged ASTM A 181, 150#, forged steel at valves, and equipment.
- D. Sanitary Waste and Vent - Above and Under Ground:
1. Pipe: Cast Iron, CISPI Standard 301, ASTM A74, ASTM A888, ASTM, A74 and C564 (below ground).
Fittings: Cast Iron, drainage pattern, ASTM A74, ASTM C564 (below ground).
Joints: No-Hub, Heavy Duty clamps, neoprene Gaskets (below ground).
 2. Pipe (Underground and aboveground in non-plenum areas only): PVC Schedule 40, ASTM D 2665 and D1784 approved, type DWV
Fittings: PVC, ASTM D 3311
Joints: Screwed or solvent weld, ASTM D2564
- E. Cooling Coil Condensate Waste and Equipment Drains - Above Ground:

1. Pipe: Type DWV Copper, hard drawn, ASTM B306
Fittings: Wrought Copper, ANSI B16.22
2. Joints: Soldered.
3. Pipe (in non-plenum areas only): PVC Schedule 40, ASTM D 2665 and D1784 approved, type DWV
Fittings: PVC, ASTM D 3311
4. Joints: Screwed or solvent weld, ASTM D2564

F. Storm - Above and Under Ground:

1. Pipe: Cast Iron, CISPI Standard 301, ASTM A74, ASTM A888, ASTM, A74 and C564 (below ground)
Fittings: Cast Iron, drainage pattern, ASTM A74, ASTM C564 (below ground)
2. Pipe (Underground and aboveground in non-plenum areas only): PVC Schedule 40, ASTM D-2665 and D 1784, NSF approved, type DWV
Fittings: PVC, ASTM D-3311
Joints: Solvent welded, ASTM D-2564

2.3 HYDRONIC PIPING SYSTEMS:

A. Chilled Water and Heating Hot Water - Above Ground:

1. For piping through 2":
Pipe: Type L Copper, hard drawn, ASTM B 88
Fittings: Wrought Copper, ANSI B16.22
Joints: Soldered through 2"; Brazed for 2-1/2" through 4"
2. Or Flexible cross-linked Polyethylene (Pex-A) listed in accordance with ASTM F876 and F877. Provide fittings in accordance with ASTM 877 and 1960.
3. For piping 2 1/2" and larger:
Pipe: Black Steel, Schedule 40, ASTM A 53, ERW or seamless, grade B,
Fittings: Standard weight, butt welded, black steel, ASTM A 234
Joints: Welded. Flanged ASTM A 181, 150#, forged steel at valves, and equipment.
4. Or all sizes, Polypropylene Pipe by Aquatherm Blue Pipe: ASTM F 2389, pipe pressure rating shall comply with temperature and pressure ratings per the code requirements for the applicable service. Polypropylene Fittings: ASTM F 2389, socket fusion, butt fusion, electrofusion, or fusion outlet fittings shall be used for fusion weld joints between pipe and fittings. Fittings and transition fittings shall be used where transitions are made to other piping materials or to valves and appurtenances. Polypropylene pipe shall not be threaded. Threaded transition fittings per ASTM F 2389 shall be used where a threaded connection is required.

B. Hot Water Heating - Above Ground:

1. For piping through 2":
Pipe: Type L Copper, hard drawn, ASTM B 88
Fittings: Wrought Copper, ANSI B16.22
Joints: Soldered through 2"; Brazed or Grooved for 2-1/2" through 4"

2. For piping 2 ½" and larger:
Pipe: Black Steel, Schedule 40, ASTM A 53, ERW or seamless, grade B
Fittings: Standard weight, butt welded, black steel, ASTM A 234
Joints: Welded. Flanged ASTM A 181, 150#, forged steel at valves, and equipment.

2.4 PIPE JOINTS:

- A. Soldered Joints: ASTM B32; Alloy Sb5, (95% Tin, 5% Antimony, maximum 0.20% Lead). Unless noted otherwise, joints may be screwed or flanged to suit valves and equipment. Manufacturers: Engelehard "Silverbrite 100", Harris "Bridgit"
- B. Brazed Joints: ASTM B32, silver brazed joints with 1000F minimum melting point, conforming to AWS - A5.8, "Specification for brazing filler metal". Classification BAg-1. Unless noted otherwise, joints may be screwed or flanged to suit valves and equipment. Unless otherwise noted, solder joints near flanges and threads where heat from brazing would anneal or warp flanges or threads. Manufacturers: Lucas-Milhaupt Inc. "Sil-Fos", J.W. Harris "Stay-Silv 15" and "Safety Silv"
- C. Screwed Joints: Tapered thread, ASME B1.20.1, joined with compatible compound or sealant tape applied to male thread only.
- D. Welded Joints: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded. Pipe and fittings shall be beveled and butt welded.
- E. Flanged Joints: Select materials to suit service of piping, conform to respective ANSI Standards, A21.11, B16.20, B16.21 Gasket material: full-faced for cast-iron flanges and raised-face for steel flanges. Gaskets in steam and condensate lines shall be "FLEXALLIC", 316 L stainless steel with "FLEXICARB" filler
- F. No-Hub Joints: Stainless Steel band and shield, neoprene rubber gasket. ASTM C 564. Manufacturers: Clamp-All
- F. Solvent Cement Joints: Select materials suitable for pipe materials joined and compatible with fluid served. Conform to respective ASTM Standards D-2235, D-2564, D-2855 and D-3138.
- G. Gasket Joint Lubricant - for use with grooved and no-hub joints: Provide manufacturer's recommended gasket lubricant.
- H. Copper Pressed Joint: Viega Pro-Press Fittings with peroxide cured EPDM gasket and Jointing tool. Install in strict accordance with Manufacturer's requirements. Allowed on all non-brazed copper piping.

- I. Grooved or Cut Joints – For Copper and Steel, Domestic Water, Hydronic and Heat Pump Piping: Rolled grooves, center legged peroxide cured EPDM gaskets, Ductile Iron housing (ASTM A 532 or A 536), wrought copper (ASTM B 75, ANSI B16.22) or cast bronze fittings, rated for 300 psi working pressure. Sytem shall be designed for rigid installation. Brazed flanges must be used at equipment connections. Manufacturers: Victaulic, Gruvlok.
- J. Pex-A Joints: Provide fittings from pipe manufacturer using Upinor Propex expansion fitting and engineered polymer coupling. Install in strict accordance with manufacturer's requirements.

2.5 MECHANICALLY FORMED TEE CONNECTIONS IN COPPER PIPING:

- A. Contractor may use mechanically formed Tee connections in copper piping in lieu of tee fitting only where main piping is 2 1/2" or larger and where branch connection is 3/4" or smaller. Joint must be brazed. Tool manufacturer: T-Drill.

2.6 UNIONS:

- A. Unions in steel piping systems shall be malleable iron with ground joints made between two bronze inserts.
- B. Unions in copper piping systems shall be wrought copper or brass with sweat ends.

2.7 PIPE SLEEVES:

- A. Furnish and set pipe sleeves per details on drawings.

2.8 DIELECTRIC FITTINGS:

- A. For pipe 2 inch and less: Provide brass coupling. (Dielectric unions are not acceptable).
- B. For pipe 2-1/2 inch and larger: Provide flange union with dielectric gasket and bolt sleeves.
- C. For dielectric connection in grooved piping, use manufacturer's dielectric nipple. Manufacturers: Anvil International Gruvlok Di-Lok Nipple, Victaulic Style 47 Dielectric Waterway

2.9 STRAINERS:

- A. Body shall be bronze, cast steel or cast iron, to match piping materials. Strainers shall be same size as piping, with screwed connections on piping 2" and smaller, and flanged connections on piping 2-1/2" and larger. Where grooved piping is specified, grooved joint strainers may be used. Screen area shall be twice internal area of piping. Pressure rating shall be that of piping system, minimum 125 lb. Provide 3/4" ball valve blow down valve on all strainers 2" and larger.
- B. For water, steam and condensate service, screen material stainless steel, with maximum openings of 0.033 inches (maximum) for pipes 2" and smaller and 3/64 inch for pipe sizes 2-1/2" and larger.
- C. For air and gas service, screen material stainless steel, with maximum openings of 0.006 inches (maximum) for pipes 2" and smaller and 0.009 inch for pipe sizes 2-1/2" and larger.
- D. Manufacturers: Armstrong, Anvil International, Keckley, Metraflex, Mueller, Spirax-Sarco, Victaulic, Watts, Yarway.

2.10 FLEXIBLE METAL HOSE CONNECTORS:

- A. Length and end fittings as shown in drawings, with an inner corrugated hose made of type 304, 321, or 316 stainless steel and outer braid made of 304 stainless steel. Manufacturers: Metraflex, Flex Hose Co., Flexonics, Mason.
- B. For copper piping systems, use copper construction braided hoses. Manufacturers: Anaconda, Flex Hose Co., Flexonics, Mason, Metraflex

2.11 FLEXIBLE CONNECTORS (RUBBER):

- A. Flexible connectors with neoprene and nylon type elements, forged steel flanges. Connectors shall be rated at 125 psig working pressure at 120 degrees F EPDM, ultraviolet resistant, hand wrapped, non-molded, multiple arch with control rods. Manufacturers: Mason Industries, Inc. Type SFDEJ, Mercer Rubber Co., Metraflex No. 100-HT-2 or other approved by Flexonics or Flex Hose Co.

2.12 PIPE ANCHORS:

- A. Provide pipe anchors where shown and as detailed on drawings.

2.13 PIPING TRANSITIONS:

- A. Provide transitions for joining two different types of pipe materials such as cast iron, clay, steel, copper or plastic. Fabricate transitions with bushings capable of resisting normal moisture corrosion.
- B. For copper to steel connections, see "Dielectric Fittings".

- C. Manufacturers: Cann-Tex Industries Division of Harsco Corp., "CT-Adapters", Fernco Joint Sealer Co. "PVC Donut", Joint, Inc., "Caulder".

PART 3 - EXECUTION

3.1 GENERAL PIPING INSTALLATION REQUIREMENTS:

- A. Where plastic piping is used, it shall be installed in strict accordance with the manufacturer's directions and recommendations. This includes addressing all pipe expansion with loops, anchors and joints per the manufacturer's recommendations. In addition plastic piping may only be used where allowed by code. Where plastic piping is used for pressure pipe, complete shop drawings shall be submitted indicating expansion compensation and complete pressure loss calculating supporting total pressure drop less then design.
- B. Work shall be done in accordance with applicable ordinances and codes. Arrange for inspections.
- C. Install piping to permit complete draining. Provide capped hose end ball drain valves at all low points.
- D. Installed piping shall be free from sagging. Provide for expansion and contraction of piping in an approved and safe manner by means of loops or offsets, where mechanical expansion joints are not specifically called for.
- E. Branch connections for gaseous systems shall be taken off mains on top, up at a 45 degree angle, or off the side.
- F. Branch connections for hydronic systems, shall be taken off mains up or down at a 45 degree angle or off the side.
- G. Branch piping shall be valved at the branch connection points.
- H. Provide fittings and specialties necessary to properly interconnect all items and specialties whether or not shown in detail.
- I. Clean and swab-out all piping before installation. Piping left open for extended periods shall be capped.
- J. Lay out pipe lines straight, plumb and in true alignment. Offset as required to avoid interference with other work, to conceal piping, to allow maximum headroom and to avoid interference with windows and doors. Lay out all pipes and establish their levels from bench marks, existing floors or finished grades.
- K. Piping shall be concealed unless indicated otherwise on drawings. Do not conceal piping until it has been inspected, tested, flushed and approved.
- L. Use eccentric reducing fittings to increase or decrease pipe sizes. Bushings are not acceptable. Orient reducers to prevent trapping of water.

- M. Locate groups of pipe parallel to each other, spaced to permit applying insulation and servicing of valves. Install hot and cold water lines at least 6 inches apart. Install piping at least 3 inches clear of electrical conduit and avoid running pipe within 3'-6" of electrical equipment, from floor to ceiling.
- N. Pipe extending into finished areas shall have chrome plated escutcheons large enough to cover pipe sleeves and shall fit snugly over pipe or insulation.
- O. Pitch piping as follows:
 - 1. Hydronic piping up in direction of flow at 1/16" per foot
 - 2. Steam piping down in direction of flow at 1/16" per foot
 - 3. Vent piping back toward waste at 1/16" per foot
 - 4. Waste, condensate and compressed air piping down in direction of flow at 1/8" per foot.
 - 5. Natural gas piping level or at 1/4" per 15 feet toward drip leg.

3.2 UNDERGROUND PIPING INSTALLATION REQUIREMENTS

- A. Record as-built sketches and dimensions prior to backfilling.

3.3 WELDING:

- A. All welding shall be performed by registered welders qualified to perform welding operations in accordance with the National Certified Pipe Welding Bureau's procedures and standards, ASME Code Standards and the HPACCNA Standard Manual of Welding.
- B. Submit a certified copy of "Record of Pipefitter Welder Performance Qualification Test" of any of his employees who will be doing welding on this project.
- C. No welding to building work shall be allowed without approval of Engineer.
- D. Black steel piping may be welded with chill rings in lieu of that specified.
- E. Mitered turns will not be allowed. Turns shall be made with welded type fittings.
- F. Branch take-offs with manufactured formed nipples will be permitted, if not restricted by code, and where nipple size is at least two pipe sizes smaller than the main size. Formed nipples shall be Bonney Forge "Weldolets", "Threadolets", "Sockolets".
- G. Shop welded pipe assemblies shall have all welds plainly stamped by the welding operator for inspection by the Engineer before installation.

3.4 PROTECTION AGAINST FREEZING:

- A. At any time that any of the piping is full of water for testing purposes or otherwise prior to actual heated operation, the system shall be protected against freezing by the introduction of an acceptable anti-freeze which will be flushed out before acceptance. Provision for introducing anti-freeze shall be made by means of valved connections to the system in an acceptable manner.

3.5 INSTALLATION OF PIPE HANGERS AND SUPPORTS:

- A. Arrange pipe hangers and supports to permit proper pitch of piping, free to move with pipe expansion, installed at proper intervals to totally prevent sagging and attached to building construction through approved means (see Section 15010 for building attachments). Hangers shall be located near or at changes in piping direction and concentrated loads. Valves, strainers, in line pumps and other heavy equipment shall be supported independent of the pipes. After systems have been installed and filled adjust hangers and supports to evenly distribute weight, and maintain proper pitch. Refer to drawings for pipe hanger and support details.
- B. Vertical Piping: When support locations are not indicated on the drawings, support piping at every floor level.
- C. Horizontal Piping Hanger Spacing: Space hangers in compliance with schedule on drawings and applicable codes. Support horizontal cast iron soil pipe with one hanger for each pipe length. Locate hanger close to joints.
- D. For cold piping, install hangers and supports to maintain an effective continuous thermal and vapor barrier between cold piping and hangers and supports.

3.6 INSTALLATION OF PIPE SLEEVES:

- A. Install pipe sleeves where piping passes through building construction including all walls, floors and ceilings.
- B. For new wall construction, promptly and accurately locate and securely set sleeves in forms before concrete is poured. For masonry construction, set the sleeves over the piping for Masonry Contractor to build around.

3.7 INSTALLATION OF STRAINERS:

- A. Provide Y-strainers in steam, condensate, or water piping preceding control valves, traps, pressure relief valves, pressure regulating valves and elsewhere as shown on drawings.
- B. Install strainer elements prior to flushing piping. Remove, clean and reinstall during flushing.

3.8 TRENCHING AND BACKFILLING:

- A. All trenching and backfilling required for the proper installation of the work shall be done in accordance with General Requirements.
- B. Excavate trenches so that pipe can be installed at proper depth. Lay pipe on a firm bed bearing its full length except at the bell. Where sewers are installed in backfilled areas, provide hand or machine tamping and be responsible for any settling at, or rupture to the sewer work. Keep trenches water free and as dry as possible during bedding, laying and jointing. After the joints are made, place sufficient backfill along each side of pipe to offset conditions that might tend to move the pipe off line and grade.
- C. Backfill only after pipes have been tested, inspected and approved.
- D. Sewer or water line installed on made or filled ground shall be laid upon an acceptable grilling of concrete. Encase pipe in 6" of 3000 pound concrete.
- E. Piping encountered in excavating, (if shown on the drawings or not), shall be supported, and protected from damage. If utility lines are encountered, notify the Owner's Representative and do not disturb the lines unless so directed. If existing utility lines are damaged during excavations, immediately repair the lines at no cost to the Owner.
- F. Storm and sanitary piping may be installed side by side in same trench. Water piping may be installed in same trench with drainage piping, provided trench is benched so the water pipe may be laid on a shelf of firm earth not less than eighteen inches (18") above top of drain pipe.
- G. No excavation for pipe shall be made in filled or disturbed earth until it has finally settled or compacted as directed.
- H. Restore street pavements, curbs and sidewalks disturbed in the performance of this work. Restore in a manner prescribed by authorities having jurisdiction.
- I. Where mains are to pass under roadways or in any locations where open ditches are dangerous or undesirable, the work is to be installed by tunneling. In all other locations, excavations shall be done by the open trench method and to the depths and widths as may be necessary. All material excavated shall be deposited on the sides of the trenches and beyond the reach of slides.
- J. Supports:
 - 1. Where lines pass under footings for walls or columns, or lower than adjacent footings, backfill trenches with concrete up to the level of the bottom of the footings.
 - 2. Where pipes pass over column footings, or are laid in filled ground, or above the original natural grade, or in soil of insufficient bearing quality, or in other cases where necessary, they shall be supported by creosoted timbers carried by brick piers or piles or other approved supports carried down to firm bearing as approved.

- K. Provide shoring, bracing or sheet piling necessary to maintain the banks of the excavations. Take same out as the work is backfilled. Shoring must prevent any movement of the trench banks and strains on the piping and utility lines.

3.9 FLUSHING AND CLEANING OF PIPING:

- A. Flush and clean the following piping systems:

Cold Water (flush only)
Hot Water (flush only)
Heat Pump Loop

- B. Develop plan for flushing and cleaning piping. Submit plan for approval prior to completion of piping. Provide all temporary and permanent piping, equipment, materials necessary to complete flushing and cleaning.

- C. Prior to flushing, temporarily remove, isolate or bypass dirt sensitive equipment and devices, including the following:

1. Automatic flow control valves
2. Heating and cooling coils
3. Boilers
4. Cooling towers
5. Flow measuring devices

Reinstall after flushing is complete.

- D. Prior to flushing, install fine mesh construction strainers at inlet to all equipment with connections 2-1/2" and larger. Install fine mesh construction element in permanent strainers. During flushing and cleaning, remove and clean strainers periodically. At completion of final flush, clean permanent strainers, remove construction strainers.

- E. Flushing for new piping: Flush all piping with cold water (or fire protection system where approved by owner) for a minimum of one hour, until water runs clear. Water supply shall be equivalent to piping to be flushed. Use (2) 2-1/2" fire hose connections for piping 3" and larger. Drain all low points.

- F. Chemical Cleaning for new heat pump loop and Hydronic piping: Where flushing could not be completed at 6 feet per second, and where chemical cleaning is required for new and existing piping, circulate flush water and clean strainers prior to installing cleaning chemicals. Provide cleaning chemicals, under the direction of the owner's chemical supplier. Following flushing, install cleaning chemicals and circulate through the entire system for a minimum of one hour, or as directed by chemical supplier. Take water sample for owner's use. Drain system, including all low points. Flush, drain and fill system, circulate for one hour, sample for owner's use. Drain, flush, fill, circulate and sample until system is free of cleaning chemicals, as indicated by owner's analysis of samples.

1. Estimated system volume for Heat Pump Loop System:
2. Estimated system volume for Chilled Water System:

- G. Special Provisions for Chemical Cleaning: Provide temporary pumps and piping to chemically clean piping at a minimum velocity of 6 fps without using the system pumps. Otherwise comply with chemical cleaning requirements stated above. These special provisions are required for the following piping systems: .Provide temporary bypass piping around the following equipment.

3.10 PIPING SYSTEMS PRESSURE TESTING

A. General

1. Test new systems only, from point of connection to the existing systems. Perform initial tests and correct deficiencies prior to requesting acceptance test.
2. Perform acceptance pressure tests in the presence of the Owner and authorities having jurisdiction. Acceptance tests must be satisfactorily completed before piping surfaces are concealed.
3. Pneumatic tests shall be conducted using dry, oil free compressed air, carbon dioxide or nitrogen. Evacuate personnel not directly involved in testing prior to performing pneumatic testing. Perform testing in two stages, initial and acceptance. Conduct initial testing at 5 PSI or less. Swab joints with a commercial leak detector. Repair deficiencies prior to testing at higher pressures. Under no circumstances shall plastic piping of any type be pneumatically tested, including pre-acceptance tests.
4. Components shall be removed or isolated during testing if damage may occur due to test pressure and/or test media.
5. Existing steam and hot water piping connected to piping to be tested shall be shutoff, drained and cooled before testing.

B. Acceptance Pressure Testing:

1. Pressure Requirements for testing:
 - a. Water Piping 100 psig or 1.5 working pressure 1 psig drop in 2 hours.
 - b. Compressed Air 150 psig – 2 psig drop in 2 hours.
 - c. Natural Gas 100 psig – 0 psig drop in 2 hours.
 - d. Waste and vent – 10 feet 0 leakage in 10 minutes.
2. Remake leaking gasket joints with new flange bolting. Where welded joints fail, submit proposed method of repair for approval by the Owner's representative and authorities having jurisdiction.
3. For each system tested, provide a certificate testifying that the system was satisfactorily tested and passed, using owner furnished forms.

END OF SECTION 220000

SECTION 220529 - HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 SUMMARY:

- A. This Section includes hangers, supports, attachments and other such products that are common to more than one Section of Divisions 22.
- B. This Section also includes supplemental requirements and installation materials common to more than one Section of Divisions 22.
- C. Refer to the other sections of Divisions 22 and the Drawings to determine the extent of the required Work. Mechanical materials and methods for other systems, not described in this Section, are specified in the various mechanical sections.

1.2 REFERENCES:

- A. American Society of Mechanical Engineers (ASME):
 - 1. B1.1 – Unified Inch Screw Threads (UN and UNR Thread Form).
 - 2. B31.1 – Power Piping.
- B. American Society for Testing and Materials (ASTM):
 - 1. A123 – Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. A153 – Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 3. A570/A570M – Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
 - 4. A633/A633M – Specification for Normalized High-Strength Low-Alloy Structural Steel Plates.
 - 5. B633 – Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
- C. Cast Iron Soil Pipe Institute (CISPI):
 - 1. 310 – Couplings for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
- D. Federal Specifications (Fed Spec.):
 - 1. FF-S-325 – Shield, Expansion; Nail, Expansion; and Nail, Drive Screw (Devices, Anchoring, Masonry).
- E. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS):
 - 1. SP-58 – Pipe Hangers and Supports – Materials, Design and Manufacture.
 - 2. SP-69 – Pipe Hangers and Supports – Selection and Application.
 - 3. SP-89 – Pipe Hangers and Supports – Fabrication and Installation Practices.

F. Metal Framing Manufacturers Association (MFMA):

1. Standard Publication MFMA-1.

G. National Fire Protection Association (NFPA):

1. 13 – Installation of Sprinkler Systems.

1.3 SUBMITTALS:

A. Refer to Section 220000.

B. Submit Product Data on the following:

1. Hangers.
2. Insulated pipe supports.
3. Suspended supports.
4. Base supports.
5. Attachments.
6. Inserts
7. Hanger rods.

C. Attachment Shop Drawings:

1. Submit for approval, prior to installation, support equipment and method for hanging, guiding and anchoring pipe 100-mm (4-inch) and larger from the building structure. The building structure is defined as: beams, girders, steel or concrete joists, trusses and columns. Submittal may be in the form of sketches indicating support and hanging equipment, load capacities types, make, size and locations.

D. Strut-Type Bolted Framing System Calculations and Shop Drawings:

1. Submit structural calculations for approval, including:
 - a. Description of design criteria.
 - b. Stress and deflection analysis.
 - c. Selection of framing members, fittings and accessories.
2. Submit Shop Drawings for approval, including:
 - a. All shop assembly drawings necessary to completely install the strut-type system in compliance with the Contract Documents.
 - b. All pertinent manufacturer's published data.

1.4 WARRANTY:

A. Refer to Section 220000.

PART 2 - PRODUCTS

2.1 GENERAL:

- A. Hangers and supports materials, design and manufacture in conformance with MSS-SP-58.
- B. Hangers and supports selection and application in conformance with MSS-SP-69.
- C. Provide isolation between copper piping and all wall and base-mounted supports.
- D. On insulated piping, locate hangers or supports outside the insulation and provide insulated pipe supports as hereinafter specified.
- E. Grinnell; Cooper B-Line, Inc; Carpenter and Paterson; Hilti Corp.; Michigan Hanger; Tolco Inc.; NPS Industries or Piping Technology & Products, equal to the Grinnell figures listed.
- F. Riser clamps: Grinnell "Fig. 261" galvanized steel pipe clamp for steel and cast iron piping and Grinnell "Fig. CT-121" copper-coated steel pipe clamp for copper piping.

2.2 AMBIENT TEMPERATURE PIPING SYSTEMS – HANGER AND SUPPORT TYPES:

A. Systems:

- Chilled water
- Glycol
- Domestic cold water
- Soil, waste and vent
- Rain conductor
- Condenser water
- Fire protection
- Natural gas

B. Hangers – Suspended Piping:

1. For piping NPS 2 (DN 50) and smaller carrying liquid and for all pipe through NPS 8 (DN 200) size carrying air or gases, provide adjustable swivel ring hangers, Grinnell "Fig. 69"; for pipe materials of copper, aluminum or glass that are uninsulated, use Grinnell "Fig. CT-99C".
2. For piping NPS 2-1/2 (DN 65) through NPS 6 (DN 150) carrying liquid, provide galvanized, adjustable clevis type hangers, Grinnell "Fig. 260" for steel and cast iron pipe and Grinnell "Fig. CT-65" copper-coated carbon steel adjustable clevis type hanger for copper pipe.
3. For piping NPS 8 (DN 200) and larger, carrying water, provide galvanized, adjustable, double rod type hanger, Grinnell "Fig. 171".
4. On insulated pipe, provide hangers and rod based on the o.d. of the insulated pipe.

C. Supports – Base Mounted Piping:

1. For piping up to 2 NPS (DN 50), provide a Grinnell “Fig 262” galvanized carbon steel pipe strap or compatible strut, system clamp.
2. For piping NPS 2-1/2 (DN 65) and above, provide a Grinnell “Fig. 264” adjustable pipe saddle support.
3. On insulated pipe, provide supports based on the o.d. of the insulated pipe.
4. On non-insulated copper, glass or aluminum pipe, provide 3M “No. 480” polyethylene tape between pipe and support.

2.3 HEATED PIPING SYSTEMS – HANGER AND SUPPORT TYPES:

A. Systems:

- Heating hot water
- Domestic hot water (60 deg. C (140 deg. F) and above)

B. Hangers – Suspended Piping:

1. Provide hangers of the galvanized, adjustable single rod clevis type for NPS 2 (DN 50) size and smaller, Grinnell “Fig. 260”, single rod roller type for NPS 2-1/2 (DN 65) to NPS 6 (DN 150) size, Grinnell “Fig. 181”; and adjustable double rod roller type for NPS 8 (DN 200) pipe and larger, Grinnell “Fig. 171”. Provide hangers and rods based on the od of the insulated pipe.
2. At the top of risers for movement up to 25 mm (1 inch), provide Grinnell “Fig. B-268 Type A” spring support.
3. At the top of risers for movement in excess of 25 mm (1 inch), provide Grinnell “Fig. 80-V” or “Fig. 81-H Model B Constant-Support Spring” hanger.

C. Supports and Anchors – Base-Mounted Piping:

1. Supports:

- a. Provide PTFE pipe slid assemblies consisting of clamping type slides and vertically and horizontally restrained, hold-down slide bases.
- b. Provide slides consisting of galvanized, carbon steel T/H-section with Grinnell “Fig. 212” or “Fig. 432” galvanized pipe clamps welded to the PTFE-bonded base, of the sizes and insulation thicknesses shown and specified. Provide Grinnell “Fig. 436” Type 3 for pipe up to NPS 5 (DN 125) and Grinnell “Fig. 439” Type 3 for pipe NPS 6 (DN 150) and larger. Use “Fig. 212” pipe clamps for heated piping systems and Fig. “432” pipe clamps for cooled piping systems.
- c. Provide slide bases consisting of galvanized, carbon steel Hold-down base with bonded PTFE slide surface and hold-down lugs; Grinnell type 3 base. Provide base plates with mounting holes.

2. Anchors:

- a. Provide anchors consisting of the base slides, less the PTFE slide material and with pipe clamps specified above. Grinnell "Fig. 436A" for pipe up to NPS 5 (DN 125) and "Fig. 439A for pipe NPS 6 (DN 150) and larger.

2.4 INSULATION PROTECTION SHIELDS:

- A. Provide at each support point on insulated piping through NPS 2 (DN 50), a galvanized, carbon steel, insulation protection shield equal to Grinnell "Fig. 167". Shield length and gauge: in accordance with manufacturer's recommendations. Tack weld shield to center of clevis to avoid slippage.

2.5 INSULATED PIPE SUPPORTS:

- A. Provide at each support point on insulated piping NPS 2-1/2 (DN 65) and larger, a 360-degree insert of high density, 690 kPa (100 psi), waterproofed calcium silicate, polyisocyanurate, or perlite, the same thickness as adjoining pipe insulation, selected on the basis of the service, encased in a 360-degree galvanized sheet metal shield, Shield length, gage and installation: in accordance with manufacturer's standard. Where pipe hanger spacing exceeds 3 meters (ten feet) on piping NPS 10 (DN 250) and larger, provide a double layer shield on the bearing surface.
- B. For insulated supports on vertical piping, provide insulated pipe riser clamps with upper and lower thrust plates for field welding to the clamps as recommended by the manufacturer.
- C. Where pipe is heat traced, groove the insulated pipe support and reinforce the groove as necessary for seismic loading.
- D. Provide insulated supports for each type of hanger or base support for each service with specific selections for each size pipe and weight to be supported, based on distances between supports. Submit manufacturer's recommendations as to insulation materials and type of insulated support.
- E. Provide insulated pipe supports that are load rated. Load ratings: established by pipe support manufacturer based upon testing and analysis in conformance with the latest edition of the following codes: MSS SP-58, MSS SP-69, and MSS SP-89.
- F. Make load tests on both supporting materials and configurations. All tests to be performed by an independent testing laboratory.
- G. Submit certified outline drawings complete with load ratings and independent laboratory test report on load and temperature testing of insulating materials.
- H. Insulated pipe supports manufacturers: Pipe Shields, Inc.; Value Engineered Products, Inc.; American Mechanical Insulation Sales, Inc.; Grinnell Corp.; or Rilco Mfg. Inc.

2.6 HANGERS AND SUPPORTS ATTACHMENTS:

- A. Provide C-clamps for piping up to NPS 2 (DN 50) pipe: malleable iron, galvanized, with hardened steel cup-point set, screw, lock-nut and galvanized, retaining clip, Grinnell "Fig. 86" with Fig. 89" retaining clip. Friction, spring steel, beam clip type hangers are not allowed.
- B. Provide beam clamps for water piping NPS 2-1/2 through 6 (DN 65 through 150) and for gas/air piping NPS 2-1/2 through 10 (DN 65 through 250): galvanized standard duty steel center I-beam clamps consisting of two half damp with bolt and nut assembled; Grinnell "Fig. 133" with Fig. 157" extension pieces.
- C. Provide beam clamps for water piping NPS 8 through 12 (DN 200 through 300) pipe: galvanized heavy duty steel center I-beam clamps consisting of two half clamps with bolt and nut assembled; Grinnell "Fig. 134".
- D. Provide beam clamps for water piping NPS 14 through 30 (DN 350 through 750): galvanized forged steel jaws and eye nut and steel tie rod; Grinnell "Fig. 292" (Type 28 or 29, depending on the structural shape).
- E. Provide attachment and rod size based on the rod size of the hanger.
- F. Provide all threaded type hanger rods of cadmium-plated carbon steel complying with ASME B1.1, Class 2A Fit USS National coarse thread, conforming to MSS-SP-58.
- G. Inserts: Grinnell "Fig. 282" galvanized malleable iron universal concrete insert.
- H. For attaching to rectangular tube structural members, provide Grinnell "Fig. 66" welded beam attachment. Provide with bolt and nut for rod size up to 25-mm (1-inch) and pin and cotter pins for rod size 31-mm (1-1/4-inch) and larger.
- I. Where piping is supported from walls or columns, provide a Grinnell "Fig. 195" galvanized steel bracket (with back-plate where wall mounted).
- J. Where multiple pipe runs are to be supported, provide galvanized channel framing trapeze hangers: Unistrut Corp.; Cooper B-Line, Inc.; Hilti Corp.; or Power-Strut; equal to Unistrut "P-1000" with the following Unistrut roller supports:

NPS 1 through 4 (DN 25 through 100) pipe	"P-2474"
NPS 6 through 12 (DN 150 through 300) pipe	"P-2475"
NPS 14 (DN 350) and larger pipe	"P-2476"
- K. When piping larger than NPS 6 (DN 150) is required to be suspended from a concrete structure, provide special fabricated attachments. Submit the detail of these attachments for approval prior to fabrication.
- L. Expansion Anchors: Carbon steel. Internally threaded, drop-in anchors that meet the physical requirements of Fed. Spec. FF-S-325, Group VIII, Type 1 and plated in accordance with ASTM B633; Hilti Corp. "HDI"; ITW Ramset/Red Head "Multi-Set II Drop-In"; Powers Fasteners, Inc. "Steel Drop-In"; or as approved.

2.7 STRUT-TYPE BOLTED FRAMING SYSTEM:

- A. Provide where shown or where practicable strut-type metal framing systems for the support of piping systems. Provide a system that consists of channel, fittings and hardware as defined in MFMA-1.
- B. Provide channel members that are cold formed from structural grade steel conforming to ASTM A570, Grade 33, or ASTM A633, Grade A, and hot-dip galvanized after fabrication in accordance with ASTM A123 or A153.
- C. Provide fitting and hardware with an electric-plated zinc finish after fabrication in accordance with ASTM B633, SC3 or SC1 or respectively.
- D. Manufacturers: Cooper B-Line, Inc.; Hilti Corp.; Power-Strut; Tolco, Inc.; or Unistrut Corp.

PART 3 - EXECUTION

3.1 HANGERS, SUPPORTS AND ATTACHMENTS:

- A. Provide structural supports, miscellaneous steel members, anchors, platforms, braces or tie rods and hangers required for the suspension and placement of the piping, valves and mechanical equipment required for the installation. Prime paint and touch up after erection.
- B. Support piping directly from the building structure and not from the supporting systems or equipment of other trades.
- C. Piping up to NPS 4 (DN 100) may be supported from the concrete slab or composite slabs (metal deck and concrete) using self-drill drilled-in inserts only and only from the deep (thick) rib of the composite slab. Do not support piping from the roof deck.
- D. Support piping at equipment independently from the structure so that no weight, or expansion and contraction forces will be transmitted to the equipment.
- E. Install pipe hangers and supports to allow for expansion and contraction, and placed close to fittings, valves and heavy equipment.
- F. Provide a welded support at elbows in pump suction and discharge. Extend elbow support to pump foundation or to steel bracket welded to pump base.
- G. Provide concrete housekeeping pads under floor supports where piping, ductwork or equipment is supported from floors.
- H. Install pipe hangers and supports in accordance with MSS SP-69 and MSS SP-89.
- I. Support pipe separately, not in tiers. Trapeze hangers will be permitted, upon approval, where piping is grouped together.
- J. Provide horizontal piping hangers, rods and supports with provision for a minimum of 44 mm (1-3/4) inches vertical adjustment for pipe alignment and provide with lock nuts.

- K. Install and support piping in a manner to isolate vibration and prevent sagging and movement other than that caused by thermal expansion and contraction.
- L. Install non-insulated copper piping clamped against steel supports with insulating tape between piping and supports.
- M. Maximum spans between hangers for straight horizontal runs of rigidly connected standard weight steel pipe and copper tubing on water and vapor service without concentrated loads: MSS-SP-69.
- N. Maximum spans between supports:
 - 1. For straight horizontal runs of hubless cast iron and ductile iron bell and spigot piping: MSS-SP-69.
 - 2. For fire protection piping: the applicable NFPA Standard.
 - 3. For plastic Piping: MSS-SP-69 and the manufactures required spacing guidelines. Provide supplemental supports like Upinor PEX-9 pipe support to extend spacing.
 - 4. For grooved piping with flexible couplings without concentrated loads: the manufacturer's recommendations.
- O. Provide an additional support:
 - 1. At each change in direction of piping.
 - 2. Where there are concentrated loads, such as flanges, valves and piping specialties, between maximum support spans.
- P. Adjust the suggested maximum span between support distances to compensate for weight limitations imposed by the hanger manufacturer's maximum recommended load ratings.
- Q. Cast Iron Soil Pipe:
 - 1. Support vertical components in multi-story structures at each stack base and at sufficiently close intervals to keep the system in alignment and to adequately support the pipe and its contents. Provide vertical supports consisting of floor or friction clamps at each floor but at intervals not exceeding 4.6 m (15 feet).
 - 2. Secure closet bends, trap-arms and similar branches against movement in any direction.
 - 3. Sway brace horizontal cast iron soil piping at every branch or change of direction on sizes NPS 5 (DN 125) and larger by use of braces, blocks, rodding or other suitable method in accordance with CISPI 310.
- R. Where back to back channels are used to hang piping by spanning between beams, rest the channels on the bottom flanges of the beams and secure to the beams by means of clip angles – 2 per channel welded to the beam and channel webs.
- S. When piping NPS 8 (DN 200) or larger is suspended from the structure, coordinate the location of supports of plumbing, heating and cooling and fire protection trades to insure that the total load suspended from a particular beam is not excessive.

- T. When through bolts are used, provide plates or large washers under the heads.
- U. Determine the spacing of trapeze hangers by the smallest pipe carried and the maximum permissible load recommended for the suspension elements. Single pipe hangers may be used to support small pipe at intermediate points between trapeze hangers if maximum span requirements are exceeded.
- V. Support vertical piping not subject to expansion at each floor with steel riser clamps. Install riser clamps aligned in such a manner so as not to penetrate through partitions or column covers or project into walking areas; if necessary cut off extended leg of clamp to achieve this condition.
- W. Support vertical pipes subject to thermal expansion, such as steam, condensate and hot water, installed in shafts at least at every other floor and for 9.1 meters (30 feet) on the horizontal runs of pipe at top and bottom of the shaft by spring hangers to ensure adequate support for the pipe and permit flexibility without overstressing of the pipe.
- X. Provide anchorage to restrain drainage piping joined with friction couplings, hubless and others from axial movement.
- Y. Support bases of cast iron storm and sanitary stacks on concrete, brick laid in cement mortar, or metal brackets attached to the building structure.
- Z. Connect hanger rods to beam clamps, concrete inserts, or expansion anchors.
- AA. Use beam clamps as pipe hanger attachments to the building structural members.
- BB. Do not eccentrically load steel structural members. Top beam clamps, side beam clamps, channel clamps and cantilevered supports are not permitted.
- CC. At the Contractor's option, C-clamps may be used in lieu of beam clamps on individual piping only, up to NPS 2 (DN 50) in diameter and only when running perpendicular to the steel member. Do not over-tighten the set screw and thereby over-stress the jaw. Do not use C-clamps on double angle bottom members.
- DD. In concrete structures, use inserts as pipe hanger attachments to the building for piping up to NPS 6 (DN 150).
- EE. In steel structures with joist or truss members, locate hangers at panel points.
- FF. Drilling of concrete for equipment support may be done only upon written consent of the Architect, using self-drill drilled-in inserts only and not hammers of any kind.
- GG. Secure equipment to floor slabs or concrete bases with cast-in-place anchors. Self-drill drilled-in inserts may be used where circumstances make the use of cast-in-place anchors impracticable.

3.2 STRUT-TYPE BOLTED FRAMING SYSTEM:

- A. Set system components into final position, true to line, level and plumb, in accordance with approved Shop Drawings.

- B. Anchor material firmly in place, tightening all connections to their recommended torques.

3.3 MISCELLANEOUS IRON WORK:

- A. Provide structural supports, miscellaneous steel members, anchors, platforms, braces, tie rods and hangers required to support or hang piping valves and mechanical equipment required for the installation, fabricated and installed in accordance with approved Shop Drawings. Prime paint all miscellaneous iron work and touch-up after erection. Ensure that no support members penetrate the building's exterior vapor barrier.

END OF SECTION 220529

SECTION 22 1400 – STORM DRAINAGE

PART 1 - GENERAL

1.1 Related Documents

- A. The Conditions of the Contract for Construction and the General Requirements of Division I of these Specifications apply to the Work in this Section.

1.2 Work Included

- A. The Work of this Section shall include furnishing all permits, labor, materials, fabrication and supervision to complete the removal and/or replacement of storm drains and drainage piping as indicated on the Drawings.
 - 1. Remove Floor Drain and Cap Piping
 - 2. Remove and Replace Floor Drain

1.3 Related Work

- A. Related Work specified elsewhere:
 - 1. Selective Demolition Section 02 4119
 - 2. Concrete Repairs Section 03 0130
 - 3. Cast-in-Place Concrete Section 03 3000
 - 4. Joint Sealants Section 07 9200

1.4 Reference Standards

- A. Comply with the following reference standards except where more stringent requirements are indicated on the Drawings or specified herein:
 - 1. American Society of Mechanical Engineers (ASME)
 - 2. American National Standards Institute (ANSI)
 - 3. American Society for Testing and Materials (ASTM)
- B. Contractor will be held responsible to complete all work necessary to meet the building codes. Should any change in the Drawings and Specifications be required to comply, notify the Engineer.

1.5 Quality Control

- A. Test the storm drain system under normal conditions of use per the requirements of the authorities having jurisdiction.
- B. Provide all instruments for making the tests.
- C. Test all parts of the system in the presence of the General Contractor and Engineer, for a sufficient period of time to permit a complete examination and inspection.
- D. Remedy all defects in materials or workmanship which appear during the test and retest the system.

1.6 Submittals

- A. Submit for record Manufacturer's Spec. Data Sheets for each product to be used.
- B. Submit for record schedule of operations.
- C. Submit for review and approval shop drawings for the following:
 - 1. Floor drains
 - 2. Cleanouts
 - 3. Plumbing line layout
 - 4. Plumbing line supports
 - 5. Pipes
- D. Submit for record results of storm drain system testing.

1.7 Transportation and Handling

- A. Deliver materials to the project in good condition. Store materials off the ground and protected from vandalism.

1.8 Basis of Payment

- A. Pay unit for removing floor drains and capping piping is each (EA.). The demolition and patching of the concrete shall be included in the cost.
- B. Pay unit for replacing the existing floor drains is each (EA.). The demolition and patching of the concrete, and piping including all miscellaneous fittings, hardware and hangers shall be included in the cost.
- C. The above items will be paid on a unit price basis; refer to Bid Forms.
- D. No extra compensation will be allowed because of differences between actual measurements and dimensions indicated on the Drawings.

PART 2 - PRODUCTS

2.1 Pipe

- A. PVC Schedule 80, ASTM D 1784 & ASTM D 1785, with solvent welded joints. 3-inch minimum inside diameter or as indicated on the Drawings. Diameter of new replacement pipe shall match existing diameter.

2.2 Floor drains

- A. Provide heavy duty galvanized 12" diameter floor drains with sediment buckets.
- B. Floor drain and grate shall be galvanized.
- C. Acceptable heavy duty galvanized materials are:
 - 1. 2140, Jay R. Smith, Montgomery, AL
 - 2. 1200, Wade, Tyler, TX
 - 3. Z509, Zurn, Erie, PA
 - 4. or Approved Equal
- D. Provide connection hardware as required to complete installation and as indicated on the Drawings.

2.3 Cleanouts

- A. PVC Schedule 80, ASTM D 2464 & ASTM D 2467.
- B. Provide cleanouts at all 90 degree turns or as indicated on the drawings.

2.4 Hangers

- A. Adjustable malleable galvanized or stainless steel hangers of clevis type with adjustable galvanized or stainless steel rods.
- B. Connect threaded rods to exiting concrete with stainless steel or galvanized expansion anchors. Submit expansion anchor to Engineer for approval. Approved Manufacturers are:
 - 1. ITW Ramset/Redhead
 - 2. Hilti
 - 3. Powers Fasteners
 - 4. Simpson Strong-Tie
 - 5. Or approved equal

PART 3 - EXECUTION

3.1 General

- A. Inspect area to receive the work and report immediately in writing to the Engineer, as required in the General Conditions, any unacceptable conditions. Do not proceed with work until unsatisfactory conditions have been corrected in an acceptable manner. Commencement of erection implies acceptance of related work.

3.2 Preparation

- A. Take out all necessary permits, arrange for all required inspections and pay all fees and expenses associated with performing the Mechanical Work.
- B. Contractor shall locate objects suspended below ceiling, embedded electrical conduit and reinforcement. Cored holes shall be offset to miss existing items. Offset dimensions shall be approved by Engineer prior to coring.
- C. Before starting Work, prepare and submit to the General Contractor a schedule of operations outlining the proposed order of procedure giving the dates of execution and the estimated time required for the completion of each step.
- D. Verify dimensions in the field.
- E. Verify ceiling heights or other architectural and structural details before installing any piping.
- F. Contractor shall flood each floor slab column bay prior to installation in order to locate ponds and determine which existing drains are currently functioning (at slab low point). Coordinate flooding with Owner and Engineer.
- G. Coordinate Work so as to avoid interferences with other trades. Due to the small scale of the Drawings, it is not possible to indicate all offsets, fittings or valves which may be required. Investigate the structural and finish conditions affecting this Work. Plan accordingly, furnish such offsets, fittings and valves as may be required.

3.3 Removal of Existing Materials

- A. Remove and legally dispose of piping, hangers, floor drains, etc. as indicated on the drawings.

3.4 Installation

- A. This Contractor will be responsible for cutting openings in the slabs as required to install new floor drains.
- B. Install all piping parallel to building walls and column lines, maintaining clear height as to not interfere with doorways, stairway or traffic, while keeping a neat appearance.

- C. Install piping so as to occupy a minimum of space, close to walls, ceiling, columns, or other members providing proper space for covering or removal of pipes.
- D. Work pipe into place without springing.
- E. Install all piping such that it will drain and vent as indicated on the Drawings or required. Pitch all horizontal lines 1/8-inch per foot minimum at a uniform grade.
- F. Connect piping to existing drain system.
- G. Properly support all piping installed on suitable pipe hangers and supports. All equipment for permanent hangers, supports, and anchors shall be fabricated from durable materials suitable for the service conditions and in accordance with the details indicated on the Drawings.
- A. Base required strength of hangers on the combined weight of the piping filled with water. Maximum hanger spacing shall be 4 feet on center for pipe 6" diameter or less and 3 feet on center for pipe 8" diameter or larger.
- B. Galvanized surfaces that are damaged shall be repaired by applying a minimum of 3 coats of zinc rich coating.

3.5 Cleanup

- A. At the completion of Work under this Contract, remove from the building all rubbish and accumulated materials.
- B. Provide the entire installation thoroughly free from all oil and grease after successfully completing all tests and before the Work is turned over to the Owner.

END OF SECTION 22 1400

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceways and cables.
2. Sleeve seals.
3. Demolition and renovation work.
4. Common electrical installation requirements.

1.2 SUBMITTALS

A. Product Data: For sleeve seals.

1.3 COMMON ELECTRICAL INSTALLATION REQUIREMENTS:

A. Furnish all labor and material, appliances, equipment and supervision to put in place a complete and functioning electrical system, ready for operation as specified herein and as indicated on the Drawings. System shall include, but not necessarily be limited to the following major equipment or operations:

1. New Electrical Service.
2. Complete Lighting System Installation: Interior and Exterior.
3. Complete New Power Distribution Systems.
4. Panels, Safety Switches and Control Equipment.
5. Branch Circuits, Wiring, Devices and Power Bus System.
6. Voice/Data, Telecommunication Raceways and Cable Trays.
7. Electrical Services to Mechanical Equipment, Final Connection and Testing.
8. New Addressable Fire Alarm System.
9. Power for Miscellaneous Technology Equipment.
10. New Generators.

1.4 DEFINITIONS:

A. "Provide" shall mean "furnish and install" or "furnish labor and material required for installation of".

1.5 SITE EXAMINATION:

A. Examination of the site is mandatory. Contractor is hereby held to have examined the site and have satisfied himself as to the conditions under which the work will be performed and have included in his Bid price all costs related thereto.

1.6 QUALITY ASSURANCE:

- A. References to standards, codes, Specifications, recommendations etc., shall mean the latest edition of such publications adopted and published at date of invitation to submit Bid Proposals.
- B. In addition to requirements shown or specified, comply with the applicable standards, specifications and codes listed below. Where requirements of the Contract Documents are in excess of these requirements, the Contract Documents shall govern.
- C. The following associations, codes, standards and abbreviations are included herein by reference:

ANSI	American National Standards Institute
DEQ	Department of Environmental Quality (for the state in which work occurs)
NEC	National Electrical Code Latest Edition
NECA 1	Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association.
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
UL	Underwriters' Laboratories, Inc.
- D. Approved manufacturers shall be considered for material in accordance with the requirements of Divisions 26 and 28, subject to the approval of the Architect/Engineer. Such approval applies to the manufacturer only and does not in any way act to permit any deviation from strict compliance with the requirements of these Specifications.

1.7 SUBMITTALS:

- A. Submit Shop Drawings for all major components or systems of the project, and where specified.
- B. Refer to Architectural Divisions for Shop Drawings to be submitted in transparency form, procedure and other pertinent data. For brochures and other non-reproducible forms of Shop Drawings, submit to the Architect for review, the required number of copies of Shop Drawings, of each piece of equipment and/or apparatus to be used, together with such descriptions and/or explanatory notes as may be required to give a clear idea of its arrangement and construction.
- C. Where items are referred to by symbolic designation on the drawings and specifications, all submittals shall bear the same designation. Refer to other sections of the electrical specifications for additional requirements. Submit the following in addition to any other specified systems/equipment.
 - 1. Power Distribution Equipment
 - 2. Disconnect Switches
 - 3. Contactors
 - 4. Time Switches
 - 5. Wiring Devices & Coverplates
 - 6. Lighting Fixtures, Lamps, Ballasts, Emergency Ballasts
 - 7. Identification Tags

8. Lighting Controls
 9. Fire Alarm Systems
 10. Raceways
 11. Generator Systems
 12. Wiring
- D. No apparatus or equipment shall be shipped from stock or fabricated until Shop Drawings for same have been stamped "Reviewed" or "Reviewed as Noted". If "Reviewed as Noted" status is applied all review comments must be incorporated for equipment to be ordered/fabricated and for work to proceed.
- E. Submit system components, product data and shop drawings complete for each system under one submittal. Do not break out equipment for one system between multiple submittals.
- F. If different systems are included in one submittal, clearly separate information with tabs or binding and provide different sub-numbering of systems.
- G. All Shop Drawings must be clearly marked to show equipment submitted and any deviations from specifications shall be noted in writing. Deviations not specifically noted in writing will be the Contractors responsibility to replace if installed. Do not include only model numbers to indicate submitted equipment. Model numbers/ordering numbers will not be reviewed. Edited product data will be reviewed. Strike out any information on product data that is not project specific, and edit relevant information to show actual equipment submitted. Electrical Contractor must review, sign and approve all shop drawings prior to submittal.
- H. Identify submitted equipment with nomenclature indicated on the Contract Documents.
- I. Provide project specific submittals from contractor to reviewer rather than supplier/manufacturer to reviewer. Do not include any claim of work or product "by others" if the work is the contractor's responsibility. Contractor's signature on submittal indicates that contractor finds submitted equipment and systems to meet contract document requirements.
- J. Uniquely and consecutively number each page in submittal.
- K. Shop Drawings that are incomplete, unsigned and not plainly marked will not be reviewed.
- L. Coordinate submittal schedule and construction schedule with CM/GC. Provide complete, accurate submittals to avoid re-submittals. Time required for any re-submittals is to be planned into project schedule by the Contractor. The A/E will not be responsible for construction delays due to re-submittals and will not be required to accelerate re-submittal review times. Pricing changes will not be approved due to re-submittals. Include in bid all costs required to allow for re-submittals.

1.8 CONTRACT DRAWINGS:

- A. Contract Drawings for electrical work are diagrammatic, intended to convey the scope of the work and indicate general arrangement of systems and approximate locations of equipment and outlets. Do not scale Drawings for measurements.
- B. Consult Architectural, Structural and Mechanical Contract Drawings and Specifications to become familiar with all conditions affecting the work, coordinate interconnecting work and other Trades affected, and verify all spaces in which the work will be installed.
- C. Where job conditions require reasonable changes in indicated locations and arrangements, make changes without extra cost to the Owner.
- D. The Contract Documents (Drawings and Specifications) are to be cooperative, and whatever is called for by either shall be binding as if called for by both.
- E. Various items of apparatus and equipment will be furnished and set under other Contracts.
- F. Remove and reinstall ceilings, including outside the renovation areas, as required to perform work. Reinstall ceilings to pre-construction condition or better, subject to review and approval of the Architect.

1.9 WORK INVOLVING OTHER TRADES:

- A. Certain items of equipment or materials specified in the Electrical Division may have to be installed by other Trades such as Mechanical Trades or Architectural Trades due to code requirements or union jurisdictional requirements. Where this occurs, Electrical Trades shall include the full cost for completing the work installed by others.
- B. Include allowance in bid for variations in electrical services (branch circuits/feeders) to mechanical equipment specified. Equipment specified and designed into Contract Documents may vary due to manufacturer differences and equipment selections and substitutions. Allow for revisions to services with no extra charge prior to installation. Coordinate with approved mechanical submittals to verify equipment characteristics prior to beginning electrical installation.
- C. Provide raceways and/or power sources for other trades where noted on their documents.

1.10 RECORD DRAWINGS:

- A. After completion of the work, provide a complete set of "Record" Drawings to Owner and the Engineer. Contractor shall obtain from Engineer at cost (\$10.00 per drawing) the project electronic files on which Contractor shall record all as-built data. Submit updated electronic Auto Cad files along with a set of marked up drawings with as-built changes for final approval.

- B. In addition to hard copy, submit on compact disks electronic versions of as built panel schedules. Submit to A/E and to Owner's Building Engineer in Microsoft excel format. Match format of schedule used for construction documents. Template file is available to Contractor from Engineer upon request.

1.11 CODES, PERMITS, INSPECTIONS AND FEES:

- A. All work shall be in accordance with National Electrical Code, latest edition and all local, state and national bodies having jurisdiction thereof.
- B. Contractor shall be licensed in the municipality in which the work is located.
- C. Contractor shall take out all permits required and arrange for all necessary inspections, licenses and approvals as required by local and state laws and shall pay all fees and expenses in connection therewith, and shall include same in Base Bid prices. Prepare any detailed drawings or diagrams which may be required by the governing authorities. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern.
- D. Upon completion of the work, furnish to the Engineer all certificates of inspection and/or approvals which are customary for the classes of work involved.

1.12 COORDINATION AND COOPERATION:

- A. Electrical Contractor shall coordinate his work with that of the Construction Manager/General Contractor as applicable and other Subcontractors for the Project.
- B. Contractor shall coordinate with designated Representative and Architect the placing of panels, flush devices or other equipment installed in masonry walls or partitions. All such flush installations shall be coordinated with masonry coursing as applicable.
- C. Chases and recesses are provided by the architectural trades, but the contractor shall be responsible for their accurate location and size.

1.13 SCHEDULING OF WORK:

- A. Work may be scheduled in phases and/or may be performed on a fast-track schedule. Prior to bid submission, coordinate with GC/CM and with Owner to determine project schedule. Include in bid all costs to achieve completion of work within project schedule.

1.14 USE OF EQUIPMENT:

- A. The use of any equipment, or any part thereof, for any purpose including testing even with the Owner's consent, shall not be construed to be an acceptance of the work on the part of the Owner, nor shall it be construed to obligate him in any way to accept improper work or defective materials.

- B. Do not use Owner's lamps for temporary lighting except as allowed and directed by the Owner. Equip lighting fixtures with new lamps when the project is turned over to the Owner.

1.15 PROPOSED SUBSTITUTIONS AND CONTRACTOR'S RESPONSIBILITY:

- A. Manufacturers other than those listed in Division 26 and 28 and may be listed for consideration in bid proposal with add or deduct costs from listed manufacturer.
- B. Any substitutions contemplated shall be subject to the final approval of the Architect/Engineer at their sole and absolute discretion prior to bid award. After bid award all products submitted shall comply with Contract Documents.
- C. Substitute equipment and material submittals shall be complete and clear and shall include all data required to establish equal quality, to specified and indicated products.
- D. Substitutions will be considered only once and if found lacking in detail or required supportive data, or if they are not found to be equal by the A/E review, they will be rejected outright, and such rejection shall be final. Substitutions and changes to products will not be considered after the product has been approved or approved as noted with comments in a submittal.
- E. "Approved Equal" equipment, material or systems are intended to provide the same quality, aesthetics and performance and function as those named and are not considered as substitutes for the purpose of this article. The Architect/Engineer will review products submitted as equal and will allow or disallow their use in the project. If submitted products are not determined to be equal by the Architect/Engineer for any reason, provide the specified/listed product at no change in project cost. The Contractor's bid is to include all costs to comply with specified/indicated work. Changes in costs will not be approved for equal products.
- F. Submit product data and written description of how proposed substitution varies from specified product. Any characteristics not specifically submitted in writing as a deviation from the Contract Documents will be assumed to conform to the intent of the specified product, including space allocations.
- G. Submit project cost increases or deductions that result from the acceptance of each substitution. Additional cost to the project will not be approved unless specifically included with the substitution.

1.16 OPERATION AND MAINTENANCE MANUALS:

- A. Upon completion of the work and fourteen (14) days before final inspection, the Contractor is to compile and deliver to the Architect, three (3) sets of Manuals of material and equipment used in the building. This shall include, but shall not be limited to, transformers, light fixtures, panels, switches, wiring devices, lighting controls, fire alarm systems, etc.

- B. In each set of manuals, the following information shall be included for each item of material, equipment and hardware installed:
 - 1. Name and address of manufacturer and/or fabricator.
 - 2. Trade names, catalog number, serial number, contract number of other accurate provision for ordering replacement and spare parts.
 - 3. Certified Drawings, where applicable, showing the amount of parts and general dimensions.
 - 4. Operating and maintenance instructions and/or manuals.
 - 5. Routine maintenance procedures.
 - 6. Trouble-shooting procedures.
 - 7. Shop drawings and product data.

1.17 TEMPORARY LIGHT AND POWER:

- A. Consult Architectural Divisions for requirements pertaining to this work and comply.
- B. Provide complete systems of adequate capacity and design, and in accordance with Federal, State and Local Codes.
- C. Contractor shall keep fire alarm and security systems in operation at all times.
- D. Provide temporary power, including generated power if required, for all systems including mechanical systems, if required, to maintain normal building usage.
- E. AC power interruptions shall be coordinated with Architect/Engineer and Owner.

1.18 CONSTRUCTION POWER:

- A. Contractor to provide for all trades. See GC/CM documents.

1.19 TRAINING:

- A. Provide training to Owners personnel as specified in individual specification sections.
- B. Hours of training in each section are the actual time spent training Owners personnel. Travel and preparation time are not included in this time.

1.20 WARRANTY:

- A. Unless a longer period is specified in individual specification sections, provide a minimum of a one year warranty on all electrical work beginning the date of final acceptance of the project by the Owner. A manufacturer's warranty on equipment shall be extended a minimum of one year from final project acceptance. Manufacturer's warranties which are longer than a one year term shall remain in effect for their entire length.

1.21 DEMOLITION AND RENOVATION WORK:

- A. General: Provide basic materials and methods for electrical demolition and renovation work and complete in accordance with the Contract Documents and as required to obtain the final completed work contemplated.
- B. Major items of work and equipment included under this Section of the Specifications are removal and/or replacement of existing electrical equipment and material as specified, indicated maintenance of existing services to remain as applicable, existing to remain conditions, and miscellaneous relocations.
- C. Where existing slabs/floors are to be cut or demolished, the contractor, shall inspect, test, and perform all required investigations to identify the presence of telecommunication raceways, electrical feeders, branch circuits and or services which are to be maintained whether noted on the drawings or not and take all steps necessary to protect and maintain those services.
- D. Demolition and renovation work shall be carried on in a workmanlike manner with minimum disturbance to the existing structure and its occupants.
- E. All surfaces damaged by this contractor in the course of performing his work shall be restored to satisfactory condition, as directed by the architect and all costs of repairs shall be paid for by the contractor. Similarly all equipment, systems, building and site components damaged shall be repaired to pre-work condition.
- F. It is the intent of these Documents to render a complete and functioning installation in accordance with design intent. All work required to accomplish the above shall be included and performed and shall be considered as basic to the Contract work.
- G. Disconnect, remove, relocate, rewire or dispose of, any equipment interfering with new construction or effected by renovation work.
- H. In instances where actual field conditions dictate methods or materials other than those indicated on the Drawings, Contractor shall consult Architect for direction and shall be governed accordingly in carrying out the work. All work necessitated by field conditions shall be considered as incidental to the proper performance of the Contract work.
- I. Where new panelboards and other electrical equipment are installed in existing spaces, survey proposed location prior to installation. Verify that no interferences exist which would infringe on electrical equipment working clearances and panelboard dedicated electrical space as required by the National Electrical Code. Notify the Architect/Engineer of any conflicts prior to installation of equipment and related raceways.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 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:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.

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: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches above finished floor level.
- G. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- H. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- I. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- J. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- K. Aboveground, Exterior-Wall Penetrations: Seal penetrations using [steel] [cast-iron] pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.

- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 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 Division 07 Section "Penetration Firestopping."

3.5 PROTECTION AND HANDLING:

- A. All electrical systems or divisions thereof shall be duly cared for and properly protected until all systems have been completely tested, inspected and finally accepted by Owner.
- B. After delivery, before and after installation, protect equipment and material against theft, injury or damage from all causes.
- C. Protect equipment outlets, conduit openings and electrical raceways with temporary plugs or caps.
- D. Receive, properly house, hoist, handle and deliver to the proper location, equipment and material required for this Division of the work.
- E. Deliver materials to the job site in original containers and packages, bearing the manufacturer's labels indicating name, type and brand.

3.6 PAINTING, CLEANING AND TOUCH-UP:

- A. Any required painting of electrical equipment in existing areas will be done by Architectural Trades. Whenever painting is required by this Trade for certain portions of the work, it will be specifically specified hereinafter.
- B. All factory finished equipment shall be thoroughly cleaned at the completion of the work. Any equipment showing mars or rust spots shall be refinished and restored to original factory finish.

3.7 ELECTRICAL REQUIREMENTS FOR MECHANICAL WORK:

- A. Motor starters, except for those included with packaged mechanical equipment, will be furnished and installed by the Electrical Trades Contractor. These starters will be sized and shown on the Electrical Drawings or Mechanical Trades documents. Verify sizes required in coordination with Mechanical Trades documents prior to purchase.

- B. Furnish and install disconnects for mechanical and building equipment requiring the same unless otherwise specified herein or noted, to meet NEC requirements.

3.8 BUILDING EQUIPMENT AND HVAC/MECHANICAL EQUIPMENT:

- A. Provide and install all electrical work required to put in operation building and mechanical equipment requiring electrical service. See mechanical documents for additional information.
- B. Connections to new equipment shall be done in accordance with manufacturer's Shop Drawings and installation instructions. Requirements generally vary from one manufacturer to another and Contractor is bound to comply and provide all work as required although certain discrepancies regarding requirements may exist. All additional connections not shown on the drawings but called out by manufacturers' shop drawings shall be provided.
- C. Provide power wiring, protection and disconnect devices to all mechanical equipment and make final connections, including testing and motors for proper rotation. Exhaust fans may be provided with integral disconnects by Mechanical Trades.
- D. Packaged equipment is provided as a unit by manufacturer including all control and power wiring at a main junction box. Install disconnect switch, power wiring and make final connections where required.

3.9 MOUNTING HEIGHTS:

- A. Height above finished floor for all control and wiring devices shall be in accordance with the Americans With Disabilities Act (ADA). Switches shall not be more than 48" above finish floor (AFF). General purpose receptacles shall not be less than 12" AFF and no more than 48" AFF.
- B. General purpose convenience receptacles shall be mounted at 16" AFF to the bottom of outlet box. Telephone outlets shall be installed at the same height as receptacles except for wall mounted instruments, outlets shall be installed at 48" AFF.
- C. Light control switches, dimmers, manual starters and similar devices shall be generally mounted at 48" AFF.
- D. Consult all documents for special mounting heights, base mounted devices, horizontally mounted receptacles and other special mounting requirements.
- E. Receptacles in Toilet Rooms, Janitor Closets and Mechanical Rooms shall be installed at 48" AFF. Receptacles and switches at counters shall be installed at 6" above counter measured to the center of the box. Height of special devices shall be as indicated on the Drawings or as directed.
- F. Mounting heights indicated on the Drawings shall take precedence over the requirements stated herein.

- G. Whenever the mounting heights of any device is in question, consult the Architect for direction prior to roughing-in.

3.10 RESPONSIBILITY FOR VOLTAGE VERIFICATION:

- A. Contractor shall be responsible for verification of correct voltages for all mechanical and building equipment. In case of discrepancy, notify Engineer immediately and prior to Shop Drawing submittals. Failure to comply with this requirement holds Contractor fully responsible for any subsequent equipment revisions and work.

3.11 RESPONSIBILITY FOR SUBSTITUTIONS:

- A. In the event that substitute equipment, material or whole systems are approved for use on the project, the Trade Contractor using the substitute material, equipment or systems shall pay all subsequent additional costs; that may be incurred for proper implementation, function and use of such equipment; In addition, the Trade Contractor shall pay for all time expended by the Architect and/or Engineer relative to the substitution.

3.12 EXISTING EQUIPMENT AND SERVICES:

- A. All services to remain shall be maintained in safe and satisfactory operation at all times.
- B. All removed equipment shall remain the property of the Owner, if desired by the owner, and shall be disposed of as directed, either to storage, "off" the site", or salvaged by the Contractor.
- C. Relocated equipment shall be inspected, repaired when required, and thoroughly cleaned prior to installation.
- D. Where services or circuits are disconnected or discontinued, it is mandatory that any existing unused wiring be removed to the source unless specifically excepted on the Drawings. It is the intent of this article to permanently disconnect all unused circuits at the main source whenever possible. No energized circuit shall be taped and abandoned in outlet boxes unless so specified on Drawings for reuse in new work. Provide new circuits if required for equipment to remain in use if existing circuits are disturbed due to new construction.
- E. Where required by code, replace any existing to remain duplex receptacles with GFR (Ground Fault Circuit Interrupter) type. These receptacles may not be indicated on plans.
- F. Where penetrations are left in rated walls, floors and ceilings, seal the penetration to achieve a listed fire/smoke rating which matches the rating of the existing penetrated surface. Coordinate with Architect for ratings of existing surfaces. Cover all unused outlet boxes.

3.13 BRANCH CIRCUITS AND PANELBOARDS:

- A. Any existing panel schedules shown are not intended to imply actual installed conditions. Existing schedules are issued for reference only. Information indicated is taken from Owner's existing circuit directories and design drawings, which may not reflect existing conditions. Contractor is to field verify all existing conditions by circuit tracing panel feeder and all branch circuits. Contractor is required to indicate actual conditions on as-built documentation including loads of existing to remain circuits.

3.14 WIRING METHODS:

- A. Contractor may utilize existing conduits and outlet boxes provided they are in acceptable condition to Authority Having Jurisdiction. Maintain ground continuity for all raceways and boxes.
- B. Re-support existing reused conduit and boxes if required. If contractor chooses not to reuse existing raceways, include in bid work for providing new raceways.
- C. Provide new raceway where specified and indicated and where existing raceways are not in satisfactory condition to Authority Having Jurisdiction.

3.15 EXPOSED WORK:

- A. It is the intent of the overall design to conceal all work except in unfinished areas. Contractor shall utilize wall and ceiling spaces to conceal all work.
- B. Only in cases where it is impossible to conceal the work, short exposed metal surface raceways (not conduit) may be used subject to approval of Architect. Paint to match wall.

3.16 EQUIPMENT AND WORK ABANDONED IN PLACE:

- A. Electrical outlet boxes that are abandoned in walls, ceilings or floor shall be provided with suitable blank brushed stainless steel cover plates.
- B. Wiring in abandoned conduits and outlets shall be disconnected, removed to the source and properly disposed of. There shall be no exception to this rule.
- C. Conduits and other parts of electrical systems that become exposed as part of new work shall be removed as required to a point where the abandoned portion is totally concealed.

3.17 SURFACE REPAIR:

- A. Repair finished surfaces around removed electrical equipment to match final finished condition. Coordinate with Architect for finish requirements.

3.18 SERVICE SHUTDOWN AND POWER OUTAGE:

- A. No service shutdown will be allowed during regular work hours. Service shutdown and power outages will be allowed during non-work hours provided that they are scheduled with Owner or his Representative prior to any work on existing services is done. Schedule shall be in writing two weeks prior to shutdown and shall show a detailed description of the proposed work and the duration of outage.
- B. Contractor shall have sufficient number of workers on the job to accomplish the work during the allotted time as per agreed upon schedule.
- C. All outage work and service modification shall be included in Base Bid and subject to the conditions in the Contract Documents.
- D. Costs for temporary power to serve occupied areas during construction due to shutdown and outages will be the responsibility of Electrical Trades Contractor. Fire alarm and security systems must be maintained at all times.
- E. Existing 240/120V, 3 Phase, 4 Wire underground service to 250 W. Larned is provided by Public Lighting Department of Detroit (PLD) and will be de-commissioned. Coordinate all required shutdowns to allow equipment removal with PLD.
- F. Existing 208/120V, 3 Phase, 4 Wire underground service to 234 W. Larned is provided by DTE Energy. Replace service as indicated. Coordinate all work with DTE Energy.

3.19 EXISTING SWITCHBOARD

- A. Provide maintenance testing of existing switchboard in three story building including but not limited to:
 - 1. Tighten all cable connections.
 - 2. Perform thermographic survey with report.
 - 3. Clean switchboard.
 - 4. Lubricate moving parts and exercise all active components.
 - 5. Verify accuracy of all nameplates. Provide any missing nameplates and correct any that may be mislabeled.
 - 6. All new switches required in switchboard to be of same manufacturer.

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END OF SECTION 260500

SECTION 32 1723 – PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 Related Documents

- A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

1.2 Work Included

- A. The Work of this Section includes furnishing all material, labor, equipment and services to paint the following items of the types, patterns, sizes and colors as indicated on the Drawings.
 - 1. Curbs
 - 2. Parking stripes
 - 3. Traffic arrows
 - 4. Walkway stripes
 - 5. Text
 - 6. ADA accessible space logo

1.3 Related Work

- A. The following Work is related to this Section:
 - 1. Concrete Repairs Section 03 0130
 - 2. Cast-in-Place Concrete Section 03 3000
 - 3. Traffic Coatings Section 07 1800
 - 4. Joint Sealants Section 07 9200

1.4 Submittals

- A. Action Submittals
 - 1. Manufacturer's Spec Data Sheets of each product to be used.
- B. Informational Submittals
 - 1. Material Safety Data Sheets of each product, solvent, or related chemicals to be used, and certification that the materials conform to local, state, and federal environmental and worker's safety laws and regulations.
 - 2. Standard color chip for each color.

1.5 Environmental Requirements

- A. Manufacturer and Installer are required to confirm that all materials used in accordance with this Section conform to local, state, and federal environmental and workers' safety laws and regulations.
 - 1. VOC content of materials shall not exceed the limits per Environmental Protection Agency National Volatile Organic Compound Emission Standards for Architectural Coatings (40CFR59).
- B. The Installer is solely responsible for fume control and shall take all necessary precautions against injury to personnel or adjacent building occupants during application. As a minimum, Installer shall take the following precautions:
 - 1. Provide and maintain barricades.
 - 2. Locate and protect building air intakes during application.
 - 3. Follow all state, federal, and local safety regulations.
 - 4. Follow all Manufacturers' safety requirements.
 - 5. Dispose empty containers immediately and properly.
 - 6. Use protective equipment.
 - 7. Ensure work area is well vented to the exterior.

1.6 Transportation and Handling

- A. Deliver all materials to site in original, unopened containers bearing the following information:
 - 1. Name of Product
 - 2. Name of Manufacturer
 - 3. Date of Manufacture
 - 4. Lot or Batch Number
- B. Store materials under cover and protected from the weather.
- C. Replace containers showing any signs of damage with new material at no additional cost to Owner.
- D. Mix and prepare coatings only in areas designated by the Contractor for that purpose.
- E. Take precautions to prevent fire in or around coatings materials. Provide and maintain hand fire extinguisher near storage and mixing area.
- F. At no time shall the weight of the stored material placed on a slab area exceed 30 PSF or 2,000 lbs. over 20 square inches.

1.7 Basis of Payment

- A. Pavement marking preparation and application will be paid on a lump sum basis. Refer to Bid Forms.

PART 2 - PRODUCTS

2.1 Pavement Markings – Alkyd (Solvent Based)

- A. All materials shall meet Federal Specification TT-P-115F
- B. Provide pavement markings as indicated on the Drawings.
- C. Approved alkyd pavement markings are:
 - 1. SetFast Premium Alkyd Zone Marking Paint, The Sherwin Williams Company, Cleveland, Ohio.
 - a. A300 White
 - b. A303 Lead-Free Yellow
 - c. A302 Red
 - d. A305 Black
 - e. Handicap Blue Use A300 White as base and tint
 - 2. Alkyd Zone Marking Paint, ICI Paints, Cleveland, Ohio.
 - a. 22694/22693 White
 - b. 20086/20126 Lead-Free Yellow
 - c. 43619/43620 Red
 - d. 20085/28744 Black
 - e. 20083/20084 Handicap Blue
 - 3. Or approved equivalent

PART 3 - EXECUTION

3.1 Inspection

- A. Inspect surfaces to which paint will be applied and report immediately in writing to the Engineer as required in the General Conditions any conditions detrimental to the proper execution of this work.
- B. Do not proceed until unsatisfactory conditions are acceptably remedied. Commencement of work implies acceptance of related work.

3.2 Preparation

- A. Before commencing work, make certain that surfaces are thoroughly cleaned, dry, and in sound condition. The cleaning of concrete floor surfaces shall meet the requirements of ASTM Designation: D 4258 for Water Cleaning and Detergent Water Cleaning.
- B. Any existing paint stripes shall be removed by grinding or scarifying so that no visible paint stripe remains. (Restoration)
- C. Do not paint any surface that is wet or damp.
- D. Remove all oil, dust, grease, dirt, and other foreign material to ensure adequate adhesion.

- E. Lay out all striping on each level, using dimensions indicated on the Drawings. Report any discrepancies, interferences or changes in striping due to field conditions to the Engineer prior to painting. Paint Contractor shall be required to remove paint, repair surface and repaint stripes not applied in strict accordance with the Drawings.
- F. Verify compatibility with concrete sealer, joint sealant, traffic bearing membrane, and all other surface treatments as specified in Division 7.

3.3 Mixing

- A. Do not mix different types of materials or materials from different Manufacturers.
- B. Do not thin material except as recommended by Manufacturer for spray application.
- C. Mix paint thoroughly by boxing, stirring or power agitation before use.

3.4 Application

- A. Apply painting and finishing materials in accordance with the Manufacturer's directions. Use techniques best suited for the material and surfaces to which applied. Apply at 15 mils wet thickness.
- B. Do not apply paint when the air and/or surface temperature is below 50 degrees F, when relative humidity exceeds 85%, when rain is threatening or late in the evening when dew might form before drying.
- C. Parking space striping dimensions indicated on the Drawings are nominal dimensions. Tolerances shall be as follows:
 - 1. Parking space length shall equal indicated length \pm 2 inches.
 - 2. Parking space width (or base line dimension) shall equal indicated width \pm 1 inch.
 - 3. A string of parking spaces shall equal indicated dimension \pm 2 inches per run.
 - 4. Stripe width shall equal 4 inches \pm 1/4 inch.
- D. For traffic arrows, walkways stripes, and floor text add glass beads on wet paint so that proper bead embedment and retention is achieved.

3.5 Cleaning

- A. Immediately upon completion of work, clean up all paint spots, remove excess materials and equipment, and repair all paint damage to other finishes.

END OF SECTION 32 1723