

WAYNE STATE UNIVERSITY

**056-299303 Parking Structure # 2 2017
613-293199 Parking Structure #4 2017
088-293200 Parking Structure #6 2017 Renovations**



**WAYNE STATE
UNIVERSITY**

Division of Finance and Business Operations

Wayne State University

**056-299303 Parking Structure # 2 2017 Renovations
613-293199 Parking Structure #4 2017 Renovations
088-293200 Parking Structure #6 2017 Renovations**

FOR:

Board of Governors
Wayne State University
Detroit, Michigan

Owner's Representative:

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

Owner's Agent:

Kimberly Tomaszewski, Senior Buyer
WSU – Procurement & Strategic Sourcing
5700 Cass, Suite 4200
Detroit, Michigan 48202
313-577-3757 / 313-577-3747 fax
ac9934@wayne.edu and copy **leiann.day@wayne.edu**

Consultant:

Walker Consultants
525 Avis Drive, Suite 1
Ann Arbor, Michigan 48108

December 21, 2017



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INFORMATION FOR BIDDERS

OWNER: Board of Governors
Wayne State University

PROJECT: Parking Structure 2, 4 and 6 2017 Renovations
Project No. 056-299303 Parking Structure # 2 2017 Renovations
613-293199 Parking Structure #4 2017 Renovations
088-293200 Parking Structure #6 2017 Renovations

LOCATION: Wayne State University
PS #2 – 5150 John Lodge Service Drive
PS #4 – 545 E. Canfield Avenue
PS #6 – 61 Putnam Avenue
Detroit, Michigan 48202

OWNER'S AGENT: Kimberly Tomaszewski, Senior Buyer
WSU – Procurement & Strategic Sourcing
5700 Cass, Suite 4200
Detroit, Michigan 48202
313-577-3757 / 313-577-3747 fax
ac9934@wayne.edu & copy leiann.day@wayne.edu

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

Architect: Walker Consultants
525 Avis Drive, Suite 1
Ann Arbor, Michigan 48108

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: December 21, 2017

BIDDING: Bidding documents may be obtained by vendors from the University Purchasing Web Site at <http://go.wayne.edu/bids> beginning December 21, 2017. 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: 10:00 am, local time, January 5, 2018 to be held at Wayne State University – 5454 Cass Avenue, 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 January 12, 2018 at 12:00 Noon. All questions must be reduced to writing and emailed to the attention of Kimberly Tomaszewski, Senior Buyer at ac9934@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 located at 5700 Cass Avenue, Suite 4200, Detroit, MI 48202 on January 19, 2018, until 2:00 p.m. (local time).

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: **Parking Structure 2, 4 and 6 2017 Renovations**
Project No. **056-299303 Parking Structure # 2 2017 Renovations**
613-293199 Parking Structure #4 2017 Renovations
088-293200 Parking Structure #6 2017 Renovations

LOCATION: Wayne State University
PS #2 – 5150 John Lodge Service Drive
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OWNER'S AGENT: **Kimberly Tomaszewski, Senior Buyer**
WSU – Procurement & Strategic Sourcing
5700 Cass, Suite 4200
Detroit, Michigan 48202
313-577-3757 / 313-577-3747 fax
ac9934@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 based on unit prices and bid quantities as provided in the Form of Proposal.
- C. Proposals shall be submitted in duplicate on forms furnished with the Bidding documents. 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 **December 21, 2017** 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: **Parking Structure 2, 4 and 6 2017 Renovations,**

PROJECT NOS.:

056-299303 Parking Structure # 2 2017 Renovations

613-293199 Parking Structure #4 2017 Renovations

088-293200 Parking Structure #6 2017 Renovations

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

10:00 am, local time, January 5, 2018

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 **Kimberly Tomaszewski**, 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 **January 12, 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- **January 19, 2018**, 2:00 p.m.
- VI. Final Comments
- VII. Adjourn



VENDOR NAME _____

GENERAL CONTRACT - PROPOSAL FORM (revised 4 - 2017)

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: Parking Structure 2, 4 and 6 2017 Renovations

PROJECT NO.: WSU PROJECT NO.
056-299303 Parking Structure # 2 2017 Renovations
613-293199 Parking Structure #4 2017 Renovations
088-293200 Parking Structure #6 2017 Renovations

PROJECT TYPE: General Construction, concrete, demolition, specialty trades, waterproofing, mechanical, civil, electrical Work

PURCHASING AGENT: Kimberly Tomaszewski, Senior Buyer
WSU – Procurement & Strategic Sourcing
5700 Cass, Suite 4200
Detroit, Michigan 48202
313-577-3757/ 313-577-3747 fax
ac9934@wayne.edu & copy leiann.day@wayne.edu

OWNER'S REPRESENTATIVE: Aditya Andhare , 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 **Parking Structure 2, 4 and 6 2017 Renovations** project (WSU Project No. **056-299303 Parking Structure # 2 2017 Renovations**
613-293199 Parking Structure #4 2017 Renovations
088-293200 Parking Structure #6 2017 Renovations) in accordance with the Bidding Documents for the following amounts:

_____ \$ _____ 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 by 21 days after successful bidder qualification and recommendation of Award. The undersigned agrees to start construction immediately after receipt of a fully executed Contract and Purchase Order, per the dates in the construction documents. The undersigned agrees to schedule and coordinate construction operations to achieve Substantial Completion and achieve any intermediate milestone completion dates as shown on the Drawings.

Substantial Completion will be completed no later than **Parking Structure 2 and 6 August 20, 2018 Parking Structure 4 July 27, 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 therefore the Contractor shall pay as liquidated damages to the Owner the sum of \$7.75 per parking space per day for each parking space remaining closed for each day's delay in completing work for each intermediate milestone as defined on the Drawings and or Specifications, and 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: **General Construction, concrete, demolition, specialty trades, waterproofing, mechanical, civil, electrical 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:

_____ @ _____



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. To maintain compliance with State of Michigan Ordinances, 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 has been issued from the State of Michigan that is enclosed in this section

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>

If you have any questions, or require rates for additional classifications, please contact:

Michigan Department of Consumer & Industry Services,
Bureau of Safety and Regulation, Wage and Hour Division,
7150 Harris Drive,
P.O. Box 30476,
Lansing, Michigan 48909-7976

http://www.michigan.gov/dleg/0,1607,7-154-27673_27706---,00.html

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. The current applicable prevailing wage rates as identified by the State of Michigan Department of Consumer & Industry Services, Bureau of Safety and Regulation, Wage and Hour Division are attached. Refer to item C above if additional information is required.
- I. 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 STATE PREVAILING WAGE SCHEDULE FOR THIS PROJECT

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



**APPENDIX A FOR THE
STATE 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 **Kimberly Tomaszewski, 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:
 - 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>.



Parking Structure 2, 4 and 6 2017 Renovations

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.										



Parking Structure 2, 4 and 6 2017 Renovations

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
<u>WARNING TO OWNER:</u> 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.											
<u>WARNING TO DEPONENT:</u> 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.											
											(NOTARY STAMP BELOW)
Subscribed and sworn to before me this _____ day of _____											
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. If you require rates for additional classifications, contact the Michigan Department of Consumer & Industry Services.
http://www.cis.state.mi.us/bwuc/bsr/wh/revised_rates/whc_tbl.htm
- 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.

	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 _____
 Title: _____
 Name: _____

Date: _____

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 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 in accordance with the Michigan Prevailing Wages on State Projects Act 166 of 1965 as amended. Before advertising for bids on the project, the University shall request the State determine 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. If the Contract is not awarded or construction undertaken within 90 days of the date of the State's determination of prevailing rates of wages and fringe benefits, the State shall make a redetermination before the Contractor awards a Subcontract. 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 or State office 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

UNIVERSITY

By: _____

By: _____

Name: _____

Name: _____

Title: _____

Title: _____

Date: _____

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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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 Contractors 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 Contactor 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 published by the State of Michigan Department of Wage and Hour 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-



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 **December 21, 2017** and the following List of Drawings represent the scope of work as defined in the Contract Documents from Article 4.

DRAWINGS

Drawing No.:	Description
R-001	GENERAL NOTES AND W.I. LIST
R-101	STRUCTURE #2 LEVELS 1 & 2 PLAN VIEWS
R-102	STRUCTURE #2 LEVELS 3 & 4 PLAN VIEWS
R-103	STRUCTURE #2 LEVELS 5 & 6 PLAN VIEWS
R-104	STRUCTURE #4 LEVEL 2 PLAN VIEW & PHASING
R-105	STRUCTURE #4 LEVELS 3 & 4 PLAN VIEWS
R-106	STRUCTURE #4 LEVELS 5 & 6 PLAN VIEWS
R-107	STRUCTURE #4 LEVELS 7 & 8 PLAN VIEWS
R-108	STRUCTURE #6 WORK AREA REQUIREMENTS
R-109	STRUCTURE #6 LEVEL 1 (S.O.G.) PLAN VIEW
R-110	STRUCTURE #6 LEVEL 2 PLAN VIEW
R-111	STRUCTURE #6 LEVEL 3 PLAN VIEW
R-112	STRUCTURE #6 LEVEL 4 PLAN VIEW
R-113	STRUCTURE #6 LEVEL 5 PLAN VIEW
R-114	STRUCTURE #6 LEVEL 6 PLAN VIEW
R-115	STRUCTURE #6 LEVEL 7 PLAN VIEW
R-501	REPAIR DETAILS
R-502	REPAIR DETAILS
R-503	REPAIR DETAILS
R-504	REPAIR DETAILS
R-505	REPAIR DETAILS
R-506	REPAIR DETAILS



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

GENERAL REQUIREMENTS



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: Parking Structure 2, 4 and 6 2017 Renovations

**WSU PROJECT NO.: 056-299303 Parking Structure # 2 2017 Renovations
613-293199 Parking Structure #4 2017 Renovations
088-293200 Parking Structure #6 2017 Renovations**

PROJECT MANAGER: Aditya Andhare

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 **Work shall include but is not limited to; general requirements, demolition, excavation, temporary shoring, reinforcing steel, steel columns, concrete slab-on-grade, partial depth concrete floor repairs, full depth concrete floor repairs, ceiling repair, concrete beams & column repair, patching, expansion joint repairs/ replacement, crack sealant, joint sealants, cove sealants, traffic toppings, miscellaneous steel, painting, paint traffic markings, structural repairs, floor drainage repairs, storm drainage piping..**

3. The building is located at

Wayne State University
PS #2 – 5150 John Lodge Service Drive
PS #4 – 545 E. Canfield Avenue
PS #6 – 61 Putnam Avenue
Detroit, Michigan 48202

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SECTION 020010 - WORK ITEMS

PART 1 - GENERAL

RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Divisions 01 - 33 Specification Sections apply to this Section.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

WI 1.0 GENERAL REQUIREMENTS

- A. Scope of Work
 - 1. Work consists of performing all tasks, specifically required and incidental, which are not identified under separate Work Item designation, but necessary to perform the work identified in this project. This work includes, but is not limited to the following items:
 - WI 1.1 – Project Mobilization
 - WI 1.5 – Temporary Signage & Barriers

WI 1.1 PROJECT MOBILIZATION

- A. Scope of Work
 - 1. Work consists of coordinating, scheduling, obtaining and assembling at construction site all equipment, materials, permits, supplies, manpower and other essentials and incidentals necessary to perform Work defined in this Contract. Payment of lump sum amount for mobilization shall be according to following schedule and shall be based on percentage of original contract amount earned.
- B. Materials
 - 1. None
- C. Execution
 - 1. At execution of agreement by all parties, mobilization payment shall not be more than 25% of mobilization lump sum amount.

2. When billing amount earned is greater than 10% but less than 25% of original contract amount, total payment for mobilization shall not be more than 50% of mobilization lump sum amount.
3. When billing amount earned is equal to or greater than 25% but less than 50% of original contract amount, total payment for mobilization shall not be more than 75% of mobilization lump sum amount.
4. When billing amount earned is equal to or greater than 50% of original contract amount, total payment for mobilization shall be 100% of mobilization lump sum amount.

WI 1.5 TEMPORARY SIGNAGE & BARRIERS

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to provide, install, and remove following completion of project, Temporary Signage and Barriers as required for protection, safety, dust/debris control, site access, traffic control, user information, and as required by Owner/Engineer during the duration of the project. Temporary Signage and Barriers shall be installed prior to start of work, and shall remain in place until all work is completed.
2. Payment for this item is lump sum at each structure to install all required signage, barriers, and dust/debris control, maintain throughout entire project at all work areas, and remove upon completion of work.
3. This Work Item applies to Parking Structures #2, #4, and #6.

B. Materials

1. Temporary signage shall meet following minimum requirements:
 - a. Minimum size: As required for proper visibility based on intended audience (pedestrian or vehicle).
 - b. Backing material: 0.5 in. medium density overlay plywood.
 - c. Colors:
 - 1) Background: Medium orange or white.
 - 2) Symbols/Lettering: Black.
 - d. Lettering: Silk screened or die-cut.
 - 1) Font Style: Helvetica or similar.
 - 2) Size: 2 in. high minimum for pedestrian information; 4 in. high minimum for traffic information.

2. Barriers shall meet following minimum requirements:

- a. Provide positive separation between public/pedestrians/vehicles and the designated work areas.
- b. Contain all construction-generated dust/debris/water/etc. within designated work areas.

C. Execution

1. Mounting height: 5 ft. to bottom of sign. Provide mounting brackets as required.
2. Contractor shall submit shop drawings detailing sign size, layout, colors, and mounting schemes for approval prior to fabricating signs and mounting brackets.
3. Typical regulatory signs (that is, STOP, YIELD, etc.) and "Handicap" signs shall conform to all Federal, state, and local requirements for sizes, materials, and colors.
4. Temporary Signage shall be sufficient to ensure pedestrian and vehicle safety, provide clear and concise user information, and maintain traffic control throughout the entire structure, including:
 - a. Signage at all pedestrian entrances to the structure informing public of ongoing construction Project, closed work areas, etc. maintained for the duration of the Project.
 - b. Signage at all vehicle entry/exits to notify public of ongoing construction Project, closed work areas, etc.
 - c. Signage in all stair and elevator towers on all levels, indicating which levels/areas are closed and which remain open.
 - d. Signage at all work area perimeters on all levels where Work is to be performed, clearly defining work area limits and explicitly prohibiting vehicle and pedestrian access, maintained for the duration of the repairs.
 - e. Signage as necessary to maintain normal traffic flow throughout structure and around closed work areas, including access to all areas of the structure remaining open for public use during repairs. Provide signs indicating route to follow for additional areas of parking, route to follow to exit structure, and route to nearest stairs/elevators at all levels and areas adjacent to work areas.
 - f. Other signage as required by Owner/Engineer, and as needed throughout the Project.
5. Temporary Barriers shall be sufficient to maintain a positive barrier around all work areas, prevent pedestrian and vehicle access into work areas, and contain all construction-generated dust/debris/water/etc. within the work areas.
6. Dust control measures shall ensure that all construction-generated dust & debris maintains confined within the work areas, including above and below repair areas. Elevators and stair towers shall be protected from dust, debris, and water at all times. Contractor shall be responsible for cleaning all construction-generated dust and debris from structure upon completion of repairs, including stair towers and elevators.
7. Submit plan to Owner/Engineer for review prior to start of work.
8. Installation and/or removal of signage/barriers shall not cause damage to structure. Repair any damage upon removal at no cost to Owner.

WI 3.0 CONCRETE FLOOR REPAIR

A. Scope of Work

1. This Work consists of furnishing all labor, materials, equipment, supervision and incidentals including shoring necessary to locate existing spalls, locate and remove delaminated and unsound floor concrete, prepare cavities, install formwork, and install new concrete and reinforcing (as required) materials to restore concrete floor to original condition and appearance. Refer to Detail Series 3.0 for specific requirements.

B. Materials

1. Concrete repair materials shall be as specified in Division 03 Section "Cast-in-Place Concrete" and Division 03 Section "Prepackaged Repair Mortar".
2. Epoxy-coated conventional steel reinforcement shall be as specified in Division 03 Section "Cast-in-Place Concrete".
3. Epoxy adhesive for dowels shall be Hilti HIT-HY 200 Safe Set.

C. Execution

1. Locating, marking, removal, preparation, and inspection of deteriorated concrete and reinforcing steel preparation, repair, and installation shall be performed as specified in Division 02 Section "Surface Preparation for Patching and Overlay."
2. Final surface preparation, formwork, concrete placement, finishing, and curing shall be performed as specified in concrete repair material specification. Manufacturer specifications/requirements for these issues shall also be followed in the event proprietary bag mix repair materials are used.
3. Concrete Testing required in Section "Cast-in-Place Concrete" will be paid for separately by WSU. Contractor is responsible for coordination to ensure that WSU's third-party testing agency is onsite for all concrete pours to perform required testing. Provide advance notification of all concrete placement. No concrete repairs shall be placed without testing performed, unless approved in advance by Owner/Engineer.

WI 3.1A FLOOR REPAIR - PARTIAL DEPTH

- A. Refer to Work Item 3.0 "Concrete Floor Repair" for scope of Work, Materials, and Execution procedures associated with this Work Item. Refer to Detail 3.1A for specific requirements
- B. This Work Item applies to Parking Structure #2, and is payable per square foot of repair performed.

WI 3.1B FLOOR REPAIR - PARTIAL DEPTH (P/T)

- A. Refer to Work Item 3.0 "Concrete Floor Repair" for scope of Work, Materials, and Execution procedures associated with this Work Item. Refer to Detail 3.1B for specific requirements
- B. This Work Item applies to Parking Structure #4, and is payable per square foot of repair performed.
- C. All post-tensioned concrete repair work shall be performed and supervised by firm and individuals certified by PTI.

WI 3.1C FLOOR REPAIR - PARTIAL DEPTH (CONCRETE WASHES)

- A. Refer to Work Item 3.0 "Concrete Floor Repair" for scope of Work, Materials, and Execution procedures associated with this Work Item. Refer to Detail 3.1C for specific requirements.
- B. This Work Item applies to Parking Structure #6, and is payable per square foot of repair performed.
- C. Do not damage any embedded reinforcement or precast connections. Allow Engineer to observe repair cavities and condition of embedded connections. Clean all exposed steel surfaces and apply corrosion inhibitor prior to concrete placement (incidental).

WI 3.1D FLOOR REPAIR - PARTIAL DEPTH (PRETOPPED)

- A. Refer to Work Item 3.0 "Concrete Floor Repair" for scope of Work, Materials, and Execution procedures associated with this Work Item. Refer to Detail 3.1D for specific requirements.
- B. This Work Item applies to Parking Structure #6, and is payable per square foot of repair performed.

WI 3.2 FLOOR REPAIR - SLAB-ON-GRADE

- A. Refer to Work Item 3.0 "Concrete Floor Repair" for scope of Work, Materials, and Execution procedures associated with this Work Item. Refer to Detail 3.2 for specific requirements.
- B. This Work Item applies to Parking Structures #2, #4, and #6, and is payable per square foot of repair performed.
- C. Embedded conduit/wiring may be present in the slabs. Contractor responsible to locate prior to start of work. Do not cut, nick, or damage.

- D. Properly compact subbase as required (to be confirmed by testing agency); provide new subbase material as necessary (incidental). Comply with ASTM D 698.

WI 3.3A FLOOR REPAIR - FULL DEPTH (PRECAST)

- A. Refer to Work Item 3.0 "Concrete Floor Repair" for Scope of Work, Material, and Execution procedures associated with this Work Item. Refer to Detail 3.3A for specific requirements.
- B. This Work Item applies to Parking Structures #2 and #6, and is payable per square foot of repair performed.
- C. PS#2 is a field-topped precast slab (2" thick precast flange with cast-in-place topping of varying thickness). See Detail 3.3A for further information.
- D. PS#6 is a pre-topped precast slab (4" thick precast flange, with cast-in-place toppings only at select locations. See Detail 3.3A for further information.

WI 3.3B FLOOR REPAIR - FULL DEPTH (P/T)

- A. Refer to Work Item 3.0 "Concrete Floor Repair" for Scope of Work, Material, and Execution procedures associated with this Work Item. Refer to Detail 3.3B for specific requirements.
- B. This Work Item applies to Parking Structure #4, and is payable per square foot of repair performed.
- C. All post-tensioned concrete repair work shall be performed and supervised by firm and individuals certified by PTI.

WI 3.4 FLOOR REPAIR – CURBS

- A. Refer to Work Item 3.0 "Concrete Floor Repair" for Scope of Work, Material, and Execution procedures associated with this Work Item. Refer to Detail 3.4 for specific requirements.
- B. This Work Item applies to Parking Structure #2, and is payable per square foot of repair performed.

WI 3.5 INSTALL GALVANIC ANODES (ALTERNATE)

- A. Scope of Work
 - 1. This Alternate Work Item, if accepted, consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to provide and install galvanic anodes in concrete repair patches for various concrete floor and/or

beam/column/wall repair Work Items as directed by Owner/Engineer. Refer to Detail 3.5 for specific requirements.

2. This Alternate Work Item applies to Parking Structure #4, and if accepted, is payable per each anode installed.

B. Materials

1. Materials shall be as specified in Division 03 Section "Galvanic Anode Corrosion Protection System."

C. Execution

1. Concrete demolition and patching shall be in accordance with appropriate repair Work Items and is not a part of this Work Item.
2. If accepted, Contractor shall install discrete anodes at 24 inches on center (maximum) in each patch around the perimeter of the repair. (Confirm spacing with Engineer and anode manufacturer prior to start of Work). Final anode installation locations will vary, based on existing reinforcing steel layout and amount of concrete cover; determine final installation layout with Engineer and anode manufacturer input in field.
3. Contractor shall install discrete anodes on mild reinforcing steel only. Post-tension tendons/anchors shall not receive anodes.
4. Discrete anodes are to be installed per Specifications to the reinforcing bar to clean/bare metal. Orient anodes towards center of concrete members where possible to maximize concrete cover.
5. Confirm electrical connection between anode tie wire and reinforcing steel by measuring DC resistance (ohm) with a multi-meter. Connection is acceptable if DC resistance is less than 1 ohm
6. For highly resistive repair concrete (latex, micro silica/pozzolan enhanced, etc.), bridging mortar between discrete anode and existing concrete substrate shall be installed to provide a proper electrically conductive path. Confirm with anode manufacturer and pre-packaged repair material manufacturer (as applicable).
7. Coating of reinforcing steel and anode connection wires is not to occur until after unit is installed to existing steel. Discrete anode is not to be coated with epoxy.

WI 3.6 FLOOR REPAIR – SLAB EDGE

- A. Refer to Work Item 3.0 "Concrete Floor Repair" for Scope of Work, Material, and Execution procedures associated with this Work Item. Refer to Detail 3.6 for specific requirements.
- B. This Work Item applies to Parking Structures #2 and #4, and is payable per square foot of repair performed.
- C. At Parking Structure #2, this work occurs at the cast-in-place concrete stairs. Coordinate closure of stair tower in advance with Owner.

- D. At Parking Structure #4, this work occurs as needed along the interior edge of the post-tensioned floor slabs. Locate embedded P/T temperature tendons/anchors prior to start of work. All post-tensioned concrete repair work shall be performed and supervised by firm and individuals certified by PTI.

WI 3.7 INSTALL CONCRETE WASH (OCCURS AT ALT. W.I. 25.5 SUPPLEMENTAL DRAINS) (ALTERNATE)

A. Scope of Work

1. This Work Item consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate and remove existing unsound and sound concrete, prepare resulting cavities, and install new concrete material to construct new concrete washes to provide positive drainage around new supplemental drains per Alternate Work Item 25.5.
2. This Alternate Work Item, if accepted, applies to Parking Structure #4, and is payable per square foot of repair performed, as located in the field with Engineer.
3. Incidental to this Work: Install coating system (primer, base coat, intermediate coat(s), topcoat) on all new concrete wash surfaces. Comply with requirements of W.I. 16.1 and Section "Traffic Coatings". Overlap minimum 4" onto adjacent existing sound coating.
4. Refer to Work Item "Concrete Floor Repair" for Material and Execution procedures associated with this Work Item. See Detail 3.7 for specific requirements.
5. Dimensions and thickness of new concrete washes will vary based on field conditions at each repair location. Contractor required to perform elevation surveys to determine size and depth of concrete wash required to provide positive drainage around new supplemental drains at each repair location (incidental to this work item). Submit proposed drain location and drainage plan to Engineer for approval at each repair location prior to start of Work.
6. Locate embedded post-tensioning system elements prior to start of saw-cutting or concrete removals. Do not damage any embedded items.

WI 3.9 SUPPLEMENTAL EPOXY-COATED STEEL (ALTERNATE)

A. Scope of Work

1. This Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to provide and install supplemental epoxy-coated reinforcing bars to replace/supplement defective existing reinforcing bars in concrete repair areas as directed by Engineer. Contractor shall verify condition

of existing reinforcement with Engineer prior to placing repair material at all concrete repair areas.

2. This Alternate Work Item, if accepted, applies to Parking Structure #4, and is payable per pound of reinforcement installed. Assume 10-ft. long #4 bars as the typical condition for bidding purposes. Locate and confirm requirements in the field with Engineer.
3. Reinforcement shown as required or incidental on Details, and noted as required or incidental to any other Work Items shall not be applicable for payment under this Work Item. Payment for reinforcement under this Work Item shall only be for supplemental reinforcement approved by Engineer prior to installation.

B. Materials

1. Conventional, epoxy-coated steel reinforcement shall be as specified in Section "Cast-in-Place Concrete".

C. Execution

1. Engineer shall inspect existing reinforcement as specified in Section "Surface Preparation for Patching and Overlay", Article "Inspection of Repair Preparation".
2. Contractor shall furnish and install supplemental epoxy-coated reinforcement to replace defective reinforcement as specified in Section "Surface Preparation for Patching and Overlay", Article "Reinforcement and Embedded Materials in Repair Areas".
3. Replacement of existing reinforcement damaged due to Contractor's removal operations shall be performed at no additional cost to Owner.
4. Supplemental reinforcement shall be of equal or greater diameter than the original diameter of the reinforcement being replaced. Verify in field with Engineer.

WI 3.10 SUPPLEMENTAL REINFORCING EPOXY DOWELS (ALTERNATE)

A. Scope of Work

1. This Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to dowel and epoxy-anchor supplemental epoxy-coated reinforcing bars as directed by Engineer. Unit price shall be based on 4-ft. long #4 bars, (with 6" hook as needed) with minimum embedment depth as stated in Article "Execution" below.
2. This Alternate Work Item, if accepted, applies to Parking Structure #4, and is payable per each supplemental dowel installed. Locate and confirm requirements in the field with Engineer
3. Supplemental dowels indicated as required or incidental on Details, and noted as required or incidental to any other Work Items shall not be applicable for payment under this Work Item.

4. Unit price for this Work shall include providing, installing, and epoxy-anchoring each 4-ft. long #4 bar dowel (with or without hook) as stated above. All doweled supplemental reinforcement shall be paid for under this Work Item only, and not double-billed under W.I. 3.9 also. Quantity shall be verified in field with Engineer.

B. Materials

1. Epoxy-coated steel reinforcement shall be as specified in Section "Cast-in-Place Concrete".
2. Epoxy reinforcement adhesive shall be Hilti HIT-HY200 Safe Set.

C. Execution

1. Engineer shall inspect existing reinforcement as specified in Section "Surface Preparation for Patching and Overlay", Article "Inspection of Repair Preparation".
2. Contractor shall furnish and install supplemental epoxy-coated reinforcement to replace/supplement defective reinforcement as specified in Section "Surface Preparation for Patching and Overlay", Article "Reinforcement and Embedded Materials in Repair Areas" as directed by Engineer.
3. Replacement/supplementing of existing reinforcement damaged due to Contractor's removal operations shall be performed at no additional cost to Owner.
4. Reinforcement shall be doweled into existing concrete to minimum depth given in Hilti Engineering Data that provides full development of reinforcement yield strength (but not less than 8").
5. Verify the need for supplemental dowels with Engineer prior to concrete placement at all concrete repair areas.

WI 4.0 CONCRETE CEILING REPAIR

A. Scope of Work

1. This Work consists of furnishing all labor, materials, equipment, supervision, and incidentals including shoring necessary to locate existing spalls, locate and remove delaminated and unsound overhead concrete, prepare cavities, install formwork, and install new concrete and reinforcing (as required) materials to restore overhead concrete to original condition and appearance. Refer to Detail Series 4.0 for specific requirements.

B. Materials

1. Pressure applied concrete repair material shall be as specified in Division 03 Section "Shotcrete."
2. Pre-packaged repair materials shall be as specified in Division 03 Section "Pre-Packaged Repair Mortar".

C. Execution

1. Locating, marking, removal, preparation, and inspection of deteriorated concrete and reinforcing steel preparation, repair, and installation shall be performed as specified in Division 02 Section "Surface Preparation for Patching and Overlay."
2. Final surface preparation, concrete placement, finishing and curing shall be performed as specified in concrete repair material specification. Manufacturer specifications/requirements on these issues shall also be followed in the event proprietary bag mix repair materials are used.
3. Contractor shall take care to protect adjacent areas from overspray if "Shotcrete" is used. Area adjacent to repair shall be cleaned to Owner's satisfaction prior to leaving site.

WI 4.1 CEILING REPAIR - PARTIAL DEPTH (P/T) (ALTERNATE)

- A. Refer to Work Item 4.0 "Concrete Ceiling Repair" for Scope of Work, Materials, and procedures associated with this Work Item. Refer to Detail 4.1 for specific requirements.
- B. This Work Item applies to Parking Structure #4, and is payable per square foot of repairs performed.
- C. All post-tensioned concrete repair work shall be performed and supervised by firm and individuals certified by PTI.

WI 4.9 REMOVE LOOSE CONCRETE & COAT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to locate and remove delaminated and loose overhead concrete, and coat resulting cavities with specified material. Removals shall include physically loose concrete, as well as visibly spalled, cracked, and/or delaminated areas; sound concrete is not to be removed.
2. Payment for this Work Item shall be lump sum to remove all sections of loose concrete on all overhead surfaces throughout the structure, on all levels.
3. Contractor shall verify overhead removal heights and general scope of removal requirements throughout the structures prior to submitting bid.
4. This Work Item applies to Parking Structures #2, #4, and #6.

B. Equipment

1. Removals shall be performed using hand tools. If required, chipping hammers shall be 15-lbs or less, only with pre-approval from Engineer in writing.

C. Materials

1. Sika Armatec 110 EpoCem, or approved equivalent.

D. Execution

1. Contractor shall locate areas for concrete removal in field. Engineer will verify types of removals to be performed by Contractor prior to start of Work. Contractor is responsible for locating and performing all removals on all overhead surfaces (ceilings, beams, columns, stems, walls, etc.). Engineer will perform punchlist review at end of Project to verify loose concrete removals have been performed sufficiently.
2. All steel exposed within loose concrete removal areas shall be cleaned to bare metal by sand-blasting or wire brush. Removal area shall be prepared per Section "Surface Preparation for Patching and Overlay".
3. Contractor shall coat each removal area with specified epoxy-coating material (incidental).

WI 5.0 CONCRETE BEAM REPAIR

A. Scope of Work

1. This Work consists of furnishing all labor, materials, equipment, supervision, and incidentals including shoring necessary to locate existing spalls, locate and remove delaminated and unsound overhead concrete, prepare cavities, install formwork, and install new concrete and reinforcing (as required) materials to restore concrete beams to original condition and appearance. Refer to Detail Series 5.0 for specific requirements.

B. Materials

1. Pressure applied concrete repair materials shall be as specified in Division 03 Section "Shotcrete."
2. Cast-in-place concrete repair materials shall be as specified in Division 03 Section "Cast-in-Place Concrete" and Division 03 Section "Prepackaged Repair Mortar".
3. Epoxy adhesive for dowels shall be Hilti HIT-HY 200 Safe Set.
4. Epoxy-coated conventional steel reinforcement shall be as specified in Division 03 Section "Cast-in-Place Concrete".

C. Execution

1. Locating, marking, removal, preparation, and inspection of deteriorated concrete and reinforcing steel preparation, repair, and installation shall be performed as specified in Division 02 Section "Surface Preparation for Patching and Overlay." Install shoring at repair locations where required per the Construction Documents prior to starting removals.
2. Final surface preparation, concrete placement, finishing and curing shall be performed as specified in concrete repair material specification. Manufacturer

- specifications/requirements on these issues shall also be followed in the event proprietary bag mix repair materials are used.
3. Contractor shall take care to protect adjacent areas from overspray if "Shotcrete" is used. Area adjacent to repair shall be cleaned to Owner's satisfaction prior to leaving site.

WI 5.1 BEAM REPAIR - PARTIAL DEPTH (LEDGE)

- A. Refer to Work Item 5.0 "Concrete Beam Repair" for scope of Work, Materials, and Procedure associated with this Work Item. Refer to Detail 5.1 for specific requirements.
- B. This Work Item applies to Parking Structure #2, and is payable per lineal foot of repair performed.
- C. At all locations where this Work occurs, Contractor shall provide 25-kip minimum capacity shoring (2 levels below) at both stems of double tees in repair area prior to start of concrete removals (incidental). Remove all live loads from floors above and 2 levels below beam being repaired.

WI 5.2 BEAM REPAIR - PARTIAL DEPTH (SIDE)

- A. Refer to Work Item 5.0, "Concrete Beam Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 5.2 for specific requirements.
- B. This Work Item applies to Parking Structure #2, and is payable per square foot of repair performed.
- C. Temporary Shoring required to perform this Work shall be payable under W.I. 18.1 as applicable. Verify shoring requirements in field with Engineer prior to start of concrete removals.

WI 5.3 BEAM REPAIR - PARTIAL DEPTH (UNDERSIDE)

- A. Refer to Work Item "Concrete Beam Repair" for scope of Work, materials, and procedure associated with this Work Item. Refer to Detail 5.3 for specific requirements.
- B. This Work Item applies to Parking Structure #2, and is payable per square foot of repair performed.
- C. Temporary Shoring required to perform this Work shall be payable under W.I. 18.1 as applicable. Verify shoring requirements in field with Engineer prior to start of concrete removals.

WI 5.4 BEAM REPAIR - PARTIAL DEPTH

- A. Refer to Work Item 5.0 "Concrete Beam Repair" for scope of Work, Materials, and procedures associated with this Work Item. Refer to Detail 5.4 for specific requirements.
- B. This Work Item applies to Parking Structure #4, and is payable per square foot of repair performed.
- C. Contractor shall install temporary shoring prior to concrete removals. Minimum temporary shoring requirements are shown on Detail 5.4. Contractor is responsible to provide temporary shoring to support all dead and live loads; verify in field with Engineer prior to start of Work. Remove all live loads above and below beam repair locations.

WI 5.5 BEAM REPAIR - PARTIAL DEPTH AT HAUNCH

- A. Refer to Work Item 5.0 "Concrete Beam Repair" for scope of Work, Materials, and procedures associated with this Work Item. Refer to Detail 5.5 for specific requirements.
- B. This Work Item applies to Parking Structure #4, and is payable per square foot of repair performed.
- C. Contractor shall install temporary shoring prior to concrete removals. Minimum temporary shoring requirements are shown on Detail 5.5. Contractor is responsible to provide temporary shoring to support all dead and live loads; verify in field with Engineer prior to start of Work. Remove all live loads above and 2 levels below beam being repaired.

WI 6.0 CONCRETE COLUMN REPAIR

- A. Scope of Work
 - 1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals including shoring necessary to locate existing spalls, locate and remove delaminated and unsound concrete, prepare cavities, install formwork, and install concrete and reinforcing (as required) materials to restore concrete columns to original condition and appearance. Refer to Detail Series 6.0 for specific requirements.
- B. Materials
 - 1. Pressure applied concrete repair materials shall be as specified in Division 03 Section "Shotcrete."
 - 2. Cast-in-place concrete repair materials shall be as specified in Division 03 Section "Cast-in-Place Concrete" and Division 03 Section "Prepackaged Repair Mortar".

3. Conventional steel reinforcement shall be as specified in Division 03 Section "Cast-in-Place Concrete".

C. Execution

1. Locating, marking, removal, preparation, and inspection of deteriorated concrete and reinforcing steel preparation, repair, and installation shall be performed as specified in Division 02 Section "Surface Preparation for Patching and Overlay." Install shoring at repair locations where required per the Construction Documents prior to starting removals.
2. Final surface preparation, concrete placement, finishing and curing shall be performed as specified in concrete repair material specification. Manufacturer specifications/requirements on these issues shall also be followed in the event proprietary bag mix repair materials are used.
3. Contractor shall take care to protect adjacent areas from overspray if "Shotcrete" is used. Area adjacent to repair shall be cleaned to Owner's satisfaction prior to leaving site.

WI 6.1 COLUMN REPAIR – PARTIAL DEPTH

- A. Refer to Work Item 6.0 "Concrete Column Repair" for scope of Work, Materials, and procedures associated with this Work Item. Refer to Detail 6.1 for specific requirements.
- B. This Work Item applies to Parking Structures #2, #4, and #6, and is payable per square foot of repair performed.
- C. Temporary Shoring required to perform this Work shall be payable under W.I. 18.1 as applicable. Verify shoring requirements in field with Engineer prior to start of concrete removals.

WI 7.0 CONCRETE WALL REPAIR

- A. Scope of Work
 1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals including shoring necessary to locate existing spalls, locate and remove delaminated and unsound concrete, prepare cavities, install formwork, and install concrete and reinforcing (as required) materials to restore concrete walls to original condition and appearance. Refer to Detail Series 7.0 for specific requirements.
- B. Materials
 1. Pressure applied concrete repair materials shall be as specified in Division 03 Section "Shotcrete."

2. Cast-in-place concrete repair materials shall be as specified in Division 03 Section "Cast-in-Place Concrete" and Division 03 Section "Prepackaged Repair Mortar".
3. Conventional steel reinforcement shall be as specified in Division 03 Section "Cast-in-Place Concrete".

C. Execution

1. Locating, marking, removal, preparation, and inspection of deteriorated concrete and reinforcing steel preparation, repair and installation shall be performed as specified in Division 02 Section "Surface Preparation for Patching and Overlay."
2. Final surface preparation, concrete placement, finishing and curing shall be performed as specified in concrete repair material specification. Manufacturer specifications/requirements on these issues shall also be followed in the event proprietary bag mix repair materials are used.
3. Contractor shall take care to protect adjacent areas from overspray if "Shotcrete" is used. Area adjacent to repair shall be cleaned to Owner's satisfaction prior to leaving site.

WI 7.1 WALL REPAIR - PARTIAL DEPTH

- A. Refer to Work Item 7.0 "Concrete Wall Repair" for scope of Work, Materials, and procedures associated with this Work Item. Refer to Detail 7.1 for specific requirements.
- B. This Work Item applies to Parking Structures #2, #4, and #6, and is payable per square foot of repair performed.

WI 8.0 PRECAST TEE STEM REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals including shoring necessary to locate precast tee stem elements to be repaired, shore surrounding construction supported by tee stem element being repaired, remove delaminated and unsound concrete and sound concrete, prepare cavities, install formwork, and install concrete and reinforcing (as required) to rebuild precast tee stem elements to original condition and appearance. Refer to Detail Series 8.0 for specific requirements.

B. Materials/Equipment

1. Pressure applied concrete repair materials shall be as specified in Division 03 Section "Shotcrete."
2. Cast-in-place concrete repair materials shall be as specified in Division 03 Section "Cast-in-Place Concrete" and Division 03 Section "Prepackaged Repair Mortar".

3. Conventional steel reinforcement shall be as specified in Division 03 Section "Cast-in-Place Concrete".
4. Chipping hammers shall be 15 lb or less.

C. Execution

1. Locating, marking, removal, preparation, and inspection of deteriorated concrete and reinforcing steel preparation, repair and installation shall be performed as specified in Division 02 Section "Surface Preparation for Patching and Overlay." Install shoring at repair locations where required per the Construction Documents prior to starting removals.
2. Final surface preparation, concrete placement, finishing and curing shall be performed as specified in concrete repair material specification. Manufacturer specifications/requirements on these issues shall also be followed in the event proprietary bag mix repair materials are used.
3. Contractor shall maintain forms and shores in place until concrete has attained at least 75% of 28-day strength.
4. Contractor shall take care to protect adjacent areas from overspray if "Shotcrete" is used. Area adjacent to repair shall be cleaned to Owner's satisfaction prior to leaving site.

WI 8.1 TEE STEM REPAIR - PARTIAL DEPTH (ALTERNATE)

- A. Refer to Work Item 8.0 "Precast Tee Stem Repair" for scope of Work, Materials, and procedures associated with this Work Item. Refer to Detail 8.1 for specific requirements.
- B. This Alternate Work Item applies to Parking Structure #2, and if accepted, is payable per lineal foot of repair performed.

WI 8.3 TEE STEM REPAIR – ENCASEMENT (ALTERNATE)

- A. Scope of Work
 1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to locate extensively cracked or spalled and deteriorated tee stems, install temporary shoring, remove loose or deteriorated concrete, prepare cavity, and install reinforced concrete tee stem encasement. Refer to Detail Series 8.3 for specific requirements.
 2. This Alternate Work Item applies to Parking Structure #2, and if accepted, is payable per each location of repair performed (required length of repair shown on Detail).
- B. Materials/ Equipment
 1. Repair materials shall be as specified in Sections "Cast-in-Place Concrete" and/or "Pre-packaged Repair Mortar".

2. Epoxy-coated steel reinforcing shall be as specified in Section "Cast-in-Place Concrete".
3. Chipping hammers shall be 15 lb or less. Only sections of loose concrete shall be removed; do not remove sound concrete or expose embedded reinforcement without prior direction from Engineer.
4. Temporary Shoring: Adjustable-type, rated for 6,000 lbs. at required extension.

C. Execution

1. Contractor shall locate and mark Work areas. Contractor shall review Work areas with Engineer prior to start of repairs.
2. Remove live loads above and 2 levels below repair area. Both stems of double tee being repaired shall be shored as required on Detail Series 8.3 and in accordance with Section "Cast-in-Place Concrete".
 - a. Install 25-kip minimum capacity temporary shoring (2 levels below) beneath both stems of affected double tee prior to start of concrete removals (incidental).
3. Existing location of pre-stressing strands shall be determined before Work commences.
4. Tee flange (floor slab) concrete shall be removed as needed to place repairs from above (incidental).
5. Cracked tee stem concrete shall remain in place. Do not completely remove concrete from around reinforcement. Verify concrete removal requirements with Engineer prior to start of Work.
6. Following necessary concrete removals, concrete stem surface shall be roughened to 0.25 in. amplitude.
7. Prepare surfaces per Section 025140.
8. Drill holes in stem for #4 bent bars. Exercise caution to avoid damage to pre-stressing strand and other embedded reinforcement.
9. Install epoxy-coated steel reinforcing in accordance with Section "Cast-in-Place Concrete" and Drawings.
10. Install formwork as required to conform to dimensions as shown on Details.
11. Repair materials and associated reference specifications are listed in Article "Materials" above. Repair material installation procedures shall be in accordance with referenced specifications for selected material.
12. Shop drawings for Work shall be submitted and approved by Engineer prior to start of Work.

WI 9.1 EXPANSION JOINT – NEW CONCRETE WASH W/ BLOCKOUT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to locate Work area, remove existing expansion joint materials, remove sound floor slab concrete, prepare cavity surface, install formwork, and install concrete wash and expansion joint blockout. Refer to

Detail 9.1 for specific requirements. This Work shall be coordinated with Work Items 10.3 and 16.1, and other Series 9.0 Work Items as applicable.

2. This Work Item applies to Parking Structure #4, and is payable per each concrete wash installed, at locations identified on Drawings, including all associated incidental Work.
3. Coat all exposed reinforcement, including P/T elements, with approved corrosion inhibitor (incidental). Repair damaged sheathing on exposed tendons (incidental).

B. Material

1. Concrete repair materials shall be as specified in Section "Cast-in-Place Concrete".

C. Execution

1. All P/T inspection work (W.I. 21.1) and associated P/T repairs (W.I. Series 21.0) shall be completed in the same bay/level prior to start of this Work. Confirm in field with Engineer.
2. Contractor shall remove existing expansion joint materials in manner that minimizes damage to existing blockout and adjacent concrete. Removals shall be performed with caution to avoid damaging embedded P/T system elements. P/T anchors are present along expansion joints; verify location of embedded P/T anchors and tendons prior to performing concrete removals.
3. Alterations to existing expansion joint blockout required for installation of new expansion joint system shall be performed in accordance with Work Items 3.1 / 9.2 / 9.3 / 9.4 as applicable, and Section "Surface Preparation for Patching and Overlay".
4. Contractor shall locate and mark concrete wash installation areas as located on Drawings. Confirm in field with Engineer.
5. Removal of existing expansion joint system shall be performed with caution to minimize damage to existing blockout on side of joint not receiving concrete wash (see Detail 9.1).
6. All sound and unsound concrete shall be removed from within marked boundaries by saw-cutting and chipping to sufficient width and depth as described in Detail 9.1. Caution shall be exercised during saw-cutting and concrete removal operations to avoid damaging existing P/T system elements and embedded reinforcement.
7. Spalls and delaminations located within the wash areas requiring removals beyond the requirements shown on Detail 9.1 shall be patched in accordance with Work Item 3.1. Perform other blockout repairs as necessary per W.I.s 9.2 / 9.3 / 9.4 as directed by Engineer and approved by expansion joint manufacturer.
8. Repair materials and associated reference specifications are listed in Article "Materials" above. Repair installation procedures shall be in accordance with referenced specifications for selected material.
9. Elevation of new concrete wash shall match existing elevation of slab on other side of expansion joint (typical).
10. New expansion joint system shall be installed (and paid for) per W.I. 10.3.

11. New traffic coating at concrete wash area shall be installed per requirements of W.I. 16.1 (incidental to this Work). Overlap existing coating 4" minimum.

WI 9.2 EXPANSION JOINT – NEW CONCRETE BLOCKOUT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to locate the Work area, remove sound and unsound floor slab concrete as required, install supplemental reinforcement, install formwork, and pour repair material to create new blockout ready to receive new expansion joint systems. Refer to Detail 9.2 for specific requirements and installation conditions. This Work shall be coordinated with other related expansion joint and blockout W.I.s.
2. This Work Item applies to Parking Structure #4, and is payable per lineal foot of repair performed along one side of joint. Blockout replacement required per W.I. 9.1 is incidental to that work and not applicable for payment under this item.

B. Materials

1. Cast-in-place concrete repair materials shall be as specified in Section "Cast-in-Place Concrete" and/or "Pre-packaged Repair Mortar".

C. Execution

1. Contractor shall remove existing expansion joint materials in manner that minimizes damage to adjacent concrete. Intent is to reuse existing sound concrete blockouts where possible in lieu of rebuilding per this Work Item. Confirm in field with Engineer and expansion joint manufacturer.
2. Where concrete deterioration is present and existing concrete blockouts cannot be salvaged, perform concrete removals as shown on Detail 9.2 in accordance with Section "Surface Preparation for Patching and Overlay".
3. Removals shall be performed with caution to avoid damaging embedded P/T system elements. P/T anchors are present along expansion joints; verify location of embedded P/T anchors and tendons prior to performing concrete removals.
4. All concrete requiring removal shall be square sawcut and chipped to limits/dimensions detailed. Caution shall be exercised during saw-cutting operations to avoid damaging existing embedded post-tensioning system elements and embedded reinforcement.
5. Adjacent spalls and delaminations located beyond the limits shown on Detail 9.2 shall be repaired in accordance with Work Item Series 3.0 as applicable.
6. Contractor shall allow for Engineer inspection of all cavities for condition as specified.
7. Contractor shall arrange for expansion joint manufacturer's representative to be onsite to review and approve all blockout dimensions and repair procedures prior to placing concrete.

8. Final surface preparation, concrete placement, finishing and curing shall be performed as specified in concrete repair material specification. Manufacturer specifications/requirements for these issues shall also be followed in the event proprietary bag mix repair materials are used.
9. Perform all work in accordance with Section "Expansion Joint Assemblies" and expansion joint manufacturer's written instructions/recommendations.

WI 9.3 EXPANSION JOINT – BLOCKOUT REPAIR (E/S)

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to locate the Work area, prepare surfaces, and install epoxy/sand material to fill voids and repair existing concrete expansion joint blockouts. This work is only to be performed if recommended/approved by expansion joint manufacturer, otherwise blockouts are to be repaired per other Work Items.
2. This Work Item applies to Parking Structure #4, and is payable per square foot of repair performed.
3. If approved by expansion joint manufacturer, this Work Item shall be utilized to perform minor patching and filling of voids on existing concrete blockouts that are otherwise sound. Any repair work needed at new blockouts poured by Contractor per W.I.'s 9.1 or 9.2 shall be incidental to those items, and is not applicable for payment under this item.
4. Refer to W.I. 16.9 for epoxy/sand repair material requirements/procedures.

WI 9.4 EXPANSION JOINT – MODIFY BLOCKOUT (ALTERNATE)

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to locate the Work area and sawcut existing expansion joint blockouts to provide square, consistent blockout dimensions that are acceptable to expansion joint manufacturer. This work item is only to be utilized with prior approval from Engineer and expansion joint manufacturer.
2. This Alternate Work Item applies to Parking Structure #4, and if accepted, is payable per lineal foot of repair performed along 1 side of joint.
3. If approved by Engineer and expansion joint manufacturer, Contractor shall perform saw-cutting along length of expansion joint blockout to remove minimum amount of concrete that will provide a plumb vertical edge and consistent blockout width. Sawcutting shall be performed to minimum depth that will allow installation of new expansion joint gland system (confirm with expansion joint manufacturer).

4. P/T anchors are present along expansion joint. Locate all embedded P/T elements prior to start of work, and do not damage during saw-cutting.

WI 10.0 EXPANSION JOINT REPAIR AND REPLACEMENT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove existing expansion joints, prepare adjacent concrete and furnish and install new expansion joint system. Refer to Detail Series 10.0 for specific requirements. Coordinate this Work with W.I. 9.0 Series work items as applicable.
2. Contractor and expansion joint manufacturer shall size joints (and blockout widths per W.I. series 9.0) to accommodate expected movement shown on Detail based on installation temperature conditions. Obtain manufacturer's written approval prior to installation.

B. Materials

1. Expansion joint system materials shall be as specified in Division 07 Section "Expansion Joint Assemblies," installed in strict accordance with manufacturer's recommendations.
2. Cast-in-place concrete repair materials shall be as specified in Division 03 Section "Cast-in-Place Concrete" and Division 03 Section "Prepackaged Repair Mortar".

C. Execution

1. Contractor shall remove existing expansion materials in manner that minimizes damage to adjacent concrete.
2. Where existing concrete blockouts cannot be salvaged due to concrete deterioration, repair or rebuild per W.I. Series 9.0. Obtain Engineer and expansion joint manufacturer approval of repair methods after joints are removed, but prior to start of repairs.
3. Minor alterations/repairs to otherwise sound existing expansion joint blockouts required for installation of new expansion joint system shall be performed in accordance with manufacturer's recommendations (incidental to this Work Item).
4. Joint installation procedures shall be in accordance with referenced specifications and manufacturer's recommendations.
5. All field-splicing shall be done by heat splicing (unless recommended otherwise by manufacturer). Factory-fabricate all miters, corners, and intersections (typical). Minimize amount of field-splicing. No splices allowed in drive lanes. Submit proposed locations for field-splicing to Engineer for approval.
6. Provide expansion joint manufacturer's standard horizontal to vertical detailing along columns at ends of expansion joints (incidental). Confirm with Engineer.
7. In-place testing: Prior to opening to traffic, water-test all new joints for leaks. Repair leaks revealed by examination of seal underside. Repeat test and repairs

until all leaks stopped. Provide written documentation of leak testing procedures and results.

8. Comply with all requirements of Section "Expansion Joint Assemblies".

WI 10.3 EXPANSION JOINT – ELASTOMERIC CONCRETE EDGED

- A. Refer to Work Item 10.0 "Expansion Joint Repair and Replacement" for scope of Work, materials, and procedure associated with this Work Item. Refer to Detail 10.3 for specific requirements.
- B. This Work Item applies to Parking Structure #4, and is payable per each expansion joint installed at locations shown on plans and approved by Engineer.
- C. Contractor shall be responsible to arrange for expansion joint manufacturer's representative to be present at project to participate and provide approval during all critical stages of expansion joint repair and installation, including, but not limited to:
 1. Observation of existing concrete blockouts after existing expansion joint materials have been removed. E.J. manufacturer's representative shall approve or recommend any repair work needed per W.I. Series 9.0 prior to installation of new expansion joint system based on field conditions.
 2. Approval of concrete blockout surfaces after repairs are completed, prior to installation of new expansion joint system.
 3. Sizing of new blockout widths, and sizing of new expansion joint systems based on width of existing blockouts, expected movements, and installation temperature conditions.
 4. Expansion joint gland and elastomeric concrete installation.
 5. Field-splicing operations and joint termination conditions.
 6. Leak-testing and documentation.

WI 10.6 REPLACE STAIR TOWER ISOLATION JOINT

- A. Refer to Work Item 10.0 "Expansion Joint Repair and Replacement" for scope of Work and procedures associated with this Work Item. Refer to Detail 10.6 for specific requirements.
- B. This Work Item applies to Parking Structure #2 and #6, and is payable per lineal foot of repair performed.
- C. Pre-formed silicone joint system shall be DSM by Emseal, or Engineer-approved equivalent.
- D. At PS#2, removal and re-installation of cover plate at door is incidental.
- E. At PS#6, concrete saw-cutting/grinding to create new blockout is incidental.
- F. Comply with manufacturer's written requirements and Section "Expansion Joint Assemblies".

WI 11.1 SEAL FLOOR CRACKS

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate, prepare and seal random cracks and unsealed construction and control joints in concrete floor and/or topping. Refer to Detail 11.1 for specific requirements.
2. This Work Item applies to Parking Structures #2, #4, and #6, and is payable per lineal foot of repair performed.

B. Materials

1. Approved materials for use in this Work are specified in Division 07 Section "Concrete Joint Sealants."

C. Execution

1. Contractor shall thoroughly clean and inspect concrete slabs and/or topping for cracks and unsealed construction and control joints. Those identified as either greater than 0.03 in. wide or showing evidence of water leakage and/or salt staining on ceiling below shall be sealed. All cracks and joints identified for repair shall be marked with chalk to aid in precision routing. Obtain depths to top reinforcing bars and P-T tendons in area of repair by use of a pachometer (rebar locator). Determine depth of electrical conduit (metal or plastic). Do not exceed this depth of routing where the crack to be repaired crosses the embedded items. Damage to embedded items will require repair or replacement at no cost to the Owner.
2. Cracks and construction joints shall be ground or sawcut to an adequate width and depth as required by Work Item Detail. Routing shall be performed by mechanized device that has positive mechanical control over depth and alignment of cut. Hand-held power grinders with abrasive disks shall not be used on control/construction joints, but may be used on random cracks.
3. Cavities shall be thoroughly cleaned by either sandblasting or grinding to remove all laitance, unsound concrete, and curing compounds which may interfere with adhesion. Groove shall be air-blasted to remove remaining debris.
4. Sealant materials and installation procedures shall be in accordance with referenced specifications for selected material.
5. Traffic topping manufacturer shall verify in writing that joint sealant is compatible with traffic topping.

WI 11.2 REPLACE TEE-TO-TEE SEALANT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate and mark failed joint sealant, remove existing

sealant, prepare edges and reseal tee-to-tee joints. Refer to Detail 11.2 for specific requirements.

2. This Work Item applies to Parking Structures #2 and #6.

a. At Parking Structure #2:

- 1) Base Bid W.I. 11.2 is lump sum to replace all tee-to-tee joint sealants that occur in the epoxy/sand repair areas (W.I. 16.9) as shown on plans. For bidding purposes, the total lineal footage is approximately 7,700 lineal feet. Contractor is required to verify extent of work in the field prior to submitting Bid. This lineal footage number is provided for reference only and is based on original drawings. No extras will be allowed for discrepancy between this number and actual lineal footage of tee-to-tee joint sealants required to be replaced within the epoxy/sand repair areas shown on plans.
- 2) Alternate W.I. 11.2, if accepted, is payable per lineal foot of repairs performed.

b. At Parking Structure #6, W.I. 11.2 is payable per lineal foot of repairs performed.

B. Materials

1. Approved materials for use in this Work are specified in Division 07 Section "Concrete Joint Sealants."
2. Installation of backer rod at pre-topped joints incidental.

C. Execution

1. Contractor shall locate failed joint sealant as indicated on plans. Verify in field with Engineer.
2. Contractor shall remove existing sealant from joints.
3. When existing joint dimensions do not conform to Detail 11.2, joints shall be routed, grinded, or sawcut to an adequate width and depth to match Work Item Detail or PCI recommendations for joint profile. Routing shall be performed by mechanized device that has positive mechanical control over depth and alignment of cut.
4. Cavities shall be thoroughly cleaned by either sandblasting or grinding to remove all remaining sealant and unsound concrete which may interfere with adhesion. Groove shall also be air blasted to remove remaining debris.
5. Allow prepared cavities to be observed by Engineer and sealant manufacturer prior to installing new backer rod/sealant.
6. Sealant materials and installation procedures shall be in accordance with referenced specifications for selected material.
7. Traffic topping manufacturer shall verify in writing that joint sealant is compatible with traffic topping.

WI 11.3 REPAIR CRACK / JOINT SEALANT

- A. Refer to Work Item 11.2 for similar scope of Work, materials, and procedures associated with this Work Item. Refer to Detail 11.3 for specific requirements.
- B. This Work Item applies to Parking Structure #4, and is payable per lineal foot of repair performed.
- C. This Work occurs primarily at existing construction joints. Intermediate P/T anchors are present along construction joints; verify depth/location prior to saw-cutting. Do not damage.

WI 11.4 TOOL AND SEAL CONTROL JOINTS (FOR REFERENCE ONLY)

- A. Scope of Work
 - 1. Work consists of providing all labor, materials, equipment, supervision and incidentals necessary to provide tooled and sealed control joints in concrete as shown on Drawings. Refer to Detail 11.4 for specific requirements.
 - 2. This Work Item applies to Parking Structures #2, #4, and #6, and is incidental to all concrete floor repair work.
- B. Materials
 - 1. Sealant materials shall be as specified in Division 07 Section "Concrete Joint Sealants."
- C. Execution
 - 1. Contractor shall locate and provide control/construction joints at all existing control and construction joints that occur within concrete repair areas to maintain existing joint layout. Confirm with Engineer prior to placing concrete.
 - 2. Control joints shall be tooled and formed in plastic concrete. Sawcutting joints after concrete sets is not allowed.
 - 3. Tooled joints shall be of proper dimension in plastic concrete.
 - 4. Sealant materials and installation procedures shall be in accordance with referenced specifications for selected material.

WI 11.5 REPLACE WASH SEALANTS

- A. Refer to Work Item 11.2 for similar scope of Work, materials, and procedures associated with this Work Item. Refer to Detail 11.5 for specific requirements.
- B. This Work Item applies to Parking Structure #6, and is payable per lineal foot of repair performed.

WI 11.7 COVE SEALANT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to prepare concrete surfaces and install cove sealant between floor and vertical surfaces as shown on Drawings. Refer to Detail 11.7 for specific requirements.
2. This Work Item applies to Parking Structures #2, #4, and #6.
 - a. At Parking Structure #2:
 - 1) Base Bid W.I. 11.7 is lump sum to replace all cove sealants that occur in the epoxy/sand repair areas (W.I. 16.9) as shown on plans. For bidding purposes, the total lineal footage is approximately 1,700 lineal feet. Contractor is required to verify extent of work in the field prior to submitting Bid. This lineal footage number is provided for reference only and is based on original drawings. No extras will be allowed for discrepancy between this number and actual lineal footage of cove sealants required to be replaced within the epoxy/sand repair areas shown on plans.
 - 2) Alternate W.I. 11.7, if accepted, is payable per lineal foot of repairs performed.
 - b. At Parking Structures #4 and #6, W.I. 11.7 is payable per lineal foot of repairs performed.

B. Materials

1. Joint sealant materials shall be as specified in Division 07 Section Concrete Joint Sealants."

C. Execution

1. Locate work areas in field with Engineer prior to start of Work.
2. Remove existing sealant (incidental).
3. Intersection to be sealed shall be thoroughly cleaned by sandblasting to remove all contaminants and foreign material.
4. Entire Work area shall then be cleaned with compressed air to assure that all loose particles have been removed and that intersection is dry.
5. Properly prepared intersection shall be coated evenly and completely with joint primer material on each of intersecting faces in accordance with sealant manufacturer's recommendations.
6. After primer has cured, apply cove sealant to intersection such that sealant extends 0.75 in. onto each of intersecting faces.
7. Work cove sealant into joint so that all air is removed and tool to concave shape such that minimum throat dimension of no less than 0.5 in. is maintained.
8. Remove excess sealant and allow to cure.

WI 15.1 PENETRATING CONCRETE SEALER – FLOORS (ALTERNATE)

A. Scope of Work

1. Work consists of providing all labor, materials, equipment, supervision and incidentals necessary to prepare surfaces and install protective sealer system on concrete surfaces.
2. This Alternate Work Item applies to PS#6, and if accepted, payment shall be lump sum to install concrete sealer on all supported floor slabs throughout the entire structure (excluding areas where existing coating is present). For bidding purposes, the total square footage is approximately 192,000 square feet. Contractor is required to verify extent of work in the field prior to submitting Bid. This square footage number is provided for reference only and is based on original drawings. No extras will be allowed for discrepancy between this number and actual square footage of sealer installation required.

B. Materials

1. Protective sealer system materials shall be as specified in Division 07 Section "Water Repellents."

C. Execution

1. All surfaces scheduled to receive protective sealer system shall be identified by Contractor. Mark with chalk all areas other than floor surfaces which are to be treated.
2. Floor surfaces shall be prepared by shotblast in accordance with referenced specification section.
3. Check moisture content with moisture meter and ensure moisture content is below maximum allowable by material manufacturer.
4. Sealer application shall be as specified in referenced specification section.

WI 16.0 TRAFFIC TOPPING

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to prepare existing floor surfaces and install traffic topping. Coating of all vertical surfaces within Work limits shall be incidental to installation of traffic topping. Refer to Detail series 16.0 for specific requirements.

B. Materials

1. Traffic topping materials shall be as specified in Division 07 Section "Traffic Coatings."

C. Execution

1. Floor surface preparation shall be performed by coating system licensed applicator or under its direct supervision.
2. Shotblast surface preparation is minimum requirement for floors.
3. Coating system shall be installed by licensed applicators in strict accordance with manufacturer's recommendations and referenced specification section.
4. Coating system shall be thoroughly cured prior to Work areas being returned to service.
5. Perform moisture testing on concrete surfaces prior to coating installation.
6. Obtain coating manufacturer's written approval of surface preparation prior to coating installation.

WI 16.1 TRAFFIC TOPPING – NEW SYSTEM

WI 16.1A TRAFFIC TOPPING – NEW SYSTEM (ALTERNATE)

WI 16.1B TRAFFIC TOPPING – NEW SYSTEM (ALTERNATE)

- A. Refer to Work Item 16.0, "Traffic Topping" for Scope of Work, materials and procedure associated with this Work Item. Refer to Detail 16.1 for specific requirements.
- B. This Work Item applies to Parking Structures #2, #4, and #6.
 1. At Parking Structure #2:
 - a. Base Bid W.I. 16.1 "Traffic Topping – New System (Localized – Level 6)" is payable per square foot of repairs performed.
 2. At Parking Structure #4:
 - a. Base Bid W.I. 16.1 "Traffic Topping – New System" is incidental to all concrete floor repair work (W.I. Series 3.0, W.I. Series 9.0, etc.). Contractor required to install complete coating system on all new concrete floor repair surfaces.
 3. At Parking Structure #6:
 - a. Alternate W.I. 16.1A is lump sum to install traffic topping on 100% of levels 6 & 7. (Re-coating of existing coated areas is incidental). For bidding purposes, the total square footage is approximately 58,000 square feet. Contractor is required to verify extent of work in the field prior to submitting Bid. This square footage number is provided for reference only and is based on original drawings. No extras will be allowed for discrepancy between this number and actual square footage of traffic topping installation required on levels 6 & 7.
 - b. Alternate W.I. 16.1B is lump sum to install traffic topping on 100% of the remaining supported levels. (Re-coating of existing coated areas is incidental). For bidding purposes, the total square footage is approximately 134,000 square feet. Contractor is required to verify extent of work in the

field prior to submitting Bid. This square footage number is provided for reference only and is based on original drawings. No extras will be allowed for discrepancy between this number and actual square footage of traffic topping installation required on levels 2-5. See R-110 for limits at slab-on-grade transition.

- C. This Work Item includes installation of complete coating system on bare concrete surfaces (primer, base coat, intermediate coat(s), and topcoat).

WI 16.2 TRAFFIC TOPPING – REPLACE EXISTING SYSTEM

A. Scope of Work

1. This Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to remove existing delaminated, unbonded, and bonded coating system from slab surface, prepare surface, and install new traffic topping system per requirements of W.I. 16.1 (incidental to this work).
2. Removal of existing coating, and installation of complete new coating system shall be included in this work.
3. This Work Item applies to Parking Structure #4, and is payable per square foot of coating installed. Removal of existing coating system shall be incidental.

B. Materials/Equipment

1. Approved traffic topping materials shall be as specified in Division 07 Section "Traffic Coatings".
2. Contractor shall be responsible for examining site to determine required method to remove existing delaminated, unbonded, and bonded coating prior to submitting bid. In some areas, the delaminated coating is unbonded and can be removed in large sections by hand; other areas may be bonded and require more extensive labor and/or equipment to be used. No extras will be allowed for failure to examine site to determine existing coating removal requirements. Scarification not allowed.

C. Execution

1. Repair areas shall be located in field with Engineer prior to start of Work.
2. Contractor shall remove existing delaminated/unbonded coating to bare concrete surface. Removals shall be performed in manner to not damage slab surface.
3. Removal areas shall be as square or rectangular-shaped as practical. At large delaminated areas, removals may be required in the entire drive lanes or complete bays. Intent is to remove all delaminated coating in a work area until sound, bonded coating is reached. Verify in field with Engineer.
4. Bare concrete surface shall then be prepared by shot-blasting.
5. Refer to requirements of W.I. 16.1 for installation of new traffic topping system (to be included as incidental to this Work). Provide primer, base coat, intermediate coat(s) with aggregate, and topcoat.

WI 16.3 TRAFFIC TOPPING – REPAIR (ALTERNATE)

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to removed failed coating, prepare surface, and install traffic topping on prepared concrete and existing traffic topping. Refer to Detail 16.3 for specific requirements.
2. This Alternate Work Item applies to Parking Structure #4, and if accepted, is payable per square foot of repair performed.
3. This Work is to be performed in conjunction with Alt. W.I. 16.4, and includes installation of primer, base coat, and intermediate coat(s) to build up system to thickness of surrounding existing coating, prior to recoating per Alt. W.I. 16.4.

B. Materials

1. Traffic topping materials shall be as specified in Division 07 Section "Traffic Coatings" and shall be compatible with existing system. Obtain written approval from new traffic topping manufacturer that existing coating surface is acceptable for installing new coating before beginning Work.

C. Execution

1. All loose existing coating shall be removed and exposed existing concrete surfaces prepared in accordance with manufacturer's recommendations and referenced specifications.
2. Completely solvent wash all existing traffic coating within work limits that is to receive new coating material. Ensure existing coating to remain is adequately bonded to existing concrete slab.

WI 16.4 TRAFFIC TOPPING – RECOAT (ALTERNATE)

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to prepare and recoat the existing traffic topping as shown on Drawings. Refer to Detail 16.4 for specific requirements.
2. This Alternate Work Item applies to Parking Structure #4, and if accepted, is payable per square foot of repair performed.

B. Materials

1. Traffic topping materials shall be as specified in Division 07 Section "Traffic Coatings" and shall be compatible with existing system. Obtain written approval from new traffic topping manufacturer that existing coating surface is acceptable for installing new coating before beginning Work.

C. Execution

1. Preparation of existing traffic topping membrane surfaces shall be in strict accordance with manufacturer's recommendations and referenced specification section. Floor surface preparation shall be performed by coating system licensed applicator or under its direct supervision.
2. Solvent washing is required for all existing coating surfaces.
3. Coating system shall be installed by licensed applicators in strict accordance with manufacturer's recommendations and referenced specification section.
4. Prior to recoating the area, any patches and/or bare concrete areas shall be coated with a base coat and an appropriate number of intermediate coats to bring the new membrane up to the level of the existing membrane per other W.I.s. After this has been completed, the entire area shall be recoated per this Work Item.
5. Existing prepared traffic topping membrane shall be recoated with a minimum of one intermediate coat with aggregate and one top coat per this Work Item.
6. Coating system shall be thoroughly cured and traffic marking completed prior to returning work areas to service.

WI 16.9 SCALED SURFACE REPAIR (EPOXY/SAND)

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to scarify, shotblast, and prepare surface of concrete topping and install epoxy/sand overlay on prepared concrete surface. Refer to Detail 16.9 for specific requirements.
2. This Work Item applies to Parking Structures #2 and #6. Payment for this Work Item shall be as described below:
 - a. Parking Structure #2: Payment shall be lump sum to perform scaled surface repairs at all areas as shown on plans. For bidding purposes, the total square footage of required Base Bid scaled surface repair is approximately 62,000 square feet. Contractor is required to verify extent of scaled surface repair in the field prior to submitting Bid. This square footage number is provided for reference only and is based on original drawings. No extras will be allowed for discrepancy between this number and actual square footage of scaled surface repair required within areas shown on plans.
 - b. Parking Structure #6: Payment shall be per square foot of repair performed.
3. At Parking Structure #2, all concrete floor repairs per other W.I.'s shall be completed prior to performing this Work. Replace cove, wash, and tee-to-tee sealants per other W.I.'s after installation of epoxy/sand repair material, per manufacturer's requirements.

B. Materials

1. Approved materials for use in this Work are as specified in Division 07 Section "Epoxy Broadcast Overlay Systems."
2. For any selected product:
 - a. Submit color sample for Owner approval.
 - b. Sand shall be 12-20 size minimum (or equivalent) unless noted otherwise. Submit samples of various sizes and colors for Owner/Engineer approval.
 - c. Provide non-sag additive as required to prevent epoxy/sand from sagging. Seed stone until rejection.
 - d. **For the topcoat, provide 5-10 mil epoxy lock coat to lock in top sand layer (incidental).**

C. Execution

1. Contractor shall locate scaled surface repair areas and verify with Engineer prior to start of Work. See Drawings R-101, R-102, and R-103.
2. All loose/delaminated existing concrete shall be removed by scarifying up to ½" amplitude.
3. After scarification, shotblast surface per manufacturer's recommendations. Water-blasting and/or sand-blasting shall then be performed to remove all dust/debris/laitance. Additional surface preparation shall be performed as needed in strict accordance with manufacturer's recommendations.
4. Install 10-ft.x10-ft. trial section of epoxy/sand system for Owner/Engineer approval, utilizing scarification, shot-blasting, water-blasting, and/or sand-blasting, and other surface preparation as required. Do not proceed with further material application until trial sections accepted in writing by Owner. Remove and replace rejected trial sections until approval is obtained (incidental).
5. Install the epoxy/sand overlay per manufacturer's recommendations to minimum depth shown on Detail (in multiple lifts as required).
6. Manufacturer's technical representative shall be onsite during surface preparation and epoxy/sand installation.
7. Provide 5-year warranty for labor and material for any material and adhesion/bonding failures.

WI 18.1 TEMPORARY SHORING

- A. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to provide, install, maintain for duration of Project, and remove upon completion of Work, Temporary Shores at localized concrete repair areas, or areas of broken P/T tendons, and remove upon completion of Work.
- B. This Work Item applies to Parking Structures #2 and #4.
- C. Payment for this Work Item shall be per each post shore installed at repair areas as directed by Engineer.

- D. Temporary shoring required on Details, and/or indicated as incidental to other Work Items NOT eligible for payment under this Item.
- E. If Contractor is unsure whether a particular repair requires temporary shoring (or how much shoring is required), verify in field with Engineer prior to concrete removals. Engineer shall approve of localized shoring procedures prior to start of Work. Contractor shall not be compensated for excessive use of shores per this Work Item.
- F. To be eligible for payment under this Work Item, amount and location of temporary shoring must be approved by Engineer prior to installation.
- G. At Parking Structure #4, temporary shoring shall be provided at 5-ft. on center maximum spacing along the full length of a tendon run at all locations where two or more consecutive tendons are found to be broken. Confirm in field with Engineer.

WI 21.0 P/T SYSTEM REPAIR – MONOSTRAND

- A. Scope of Work
 - 1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to make P/T tendon splice repairs and P/T end anchorage repairs to the monostrand post-tensioning system. Refer to Detail series 21.0 for specific requirements. Refer to Division 03 Section "Unbonded Post-Tensioning Repairs" for further requirements.
 - 2. All work performed per W.I. Series 21.0 shall be performed and supervised by Firm and personnel certified by PTI. Submit certifications to Owner for record prior to start of Work. PTI-certified superintendent or foreman shall be onsite at all times to supervise all aspects of post-tensioning repair work.
 - 3. Contractor shall document all P/T repairs on as-built drawings, and shall document and provide stressing log for all P/T repairs.
 - 4. The furnishing and installing of reinforcing steel shall be as shown on the Details. Concrete removals and replacement are not included in this work and shall be performed and paid for under Work Item series 3.0 as applicable.
 - 5. P/T System Repair Work Items apply to Parking Structure #4.
 - 6. Work/Repair Sequence:
 - a. Locate P/T inspections (W.I. 21.1) in field with Engineer.
 - b. Complete inspection openings and observe condition of tendons with Engineer to determine required repairs and repair procedures.
 - c. Perform P/T repairs as needed per W.I. Series 21.0 and 3.0 as applicable.

B. Materials

1. Post-Tensioning materials and related materials shall be as specified in Division 03 Section "Unbonded Post-Tensioning Repairs."
2. Conventional steel reinforcement shall be as specified in Division 03 Section "Cast-in-Place Concrete".
3. Epoxy adhesive for reinforcing dowels shall be Hilti HY-200 Safe Set.

C. Prequalified Suppliers:

1. Refer to Division 03 Section "Unbonded Post-Tensioning Repairs."

D. Execution

1. Prior to concrete removals, submit shoring and bracing plan for Engineer review. Engineer review does not absolve contractor's total responsibility for providing the necessary shoring and bracing to maintain the stability of the structure and individual elements. Required post shores shall be paid for under Work Item 18.1.
2. Refer to Work Item series 21.0 and "P/T General Notes" on drawings for additional requirements.
3. Below is a general procedure for P/T tendon repairs. The actual repair procedure for each repair location may vary depending on existing conditions and shall be reviewed by the Engineer. Contractor shall coordinate with Engineer.
 - a. Locate damaged tendon, measure and record length between anchor points.
 - b. Measure and record cable separation, failure point and offset from nearest column face. Mark adjacent floor slab beyond concrete removal boundary to reference the failed tendon end points.
 - c. Mark cable path on floor surface between anchors with marking paint.
 - d. Inspect floor slab top and bottom for cracks, delaminations, and spalls.
 - e. Remove all unsound and delaminated concrete only from floor and ceiling surfaces along tendon path (see item 1 above).
 - 1) Closely inspect the exposed tendon for damage at all concrete removal sites. If no damage is observed, proceed to step F. If damage is observed, comply with step 2 below.
 - 2) Mark all damaged points for inspection by Engineer. Do not proceed with further concrete removals until after Engineer's inspection and approval.
 - f. As directed by the Engineer, perform full depth removal at tendon anchorage to expose only the non-stressed side of the anchor plate. Excavate the anchorage nearest the failure point first then, excavate the opposite end. Inspect the anchorage for damage. Note that the tendon will probably retain some residual stress from corrosion lock up at the tendon high points. Continue to use extra caution during concrete removals.
 - g. Coordinate inspection of end anchors by Engineer.

- h. As directed by the Engineer, continue partial concrete removals at tendon high points adjacent to the tendon failure locations. Removal should begin at the high point (closest to the failure) and work successively towards the nearest exposed anchor. Perform removals a safe distance away from end anchors and intermediate anchors. Perform removals so as to systematically de-tension and free up each tendon in small sections between removal points. The Engineer may direct termination of concrete removals if exposed tendons are found to be relaxed and free of corrosion. Cease removals as the Engineer directs, or when damaged tendon is released along its entire length.
- i. Perform remaining concrete removals both partial and full depth to accommodate tendon splicing and new end anchor installation.
- j. Engineer will determine location, type and extent of tendon repair.
- k. Install splice couplings, end anchors, sheathing, new tendons and reinforcing steel per the applicable Work Item and in accordance with Division 03 Section "Unbonded Post-Tensioning Repairs." Cleaning and epoxy coating of all exposed reinforcing steel and P/T materials is incidental to concrete work.
- l. Install patch concrete both partial and full depth at all locations except at stressing pockets and splice couplings. Concrete work shall be performed and paid for under Work Item series 3.0 or 4.0 as applicable.
- m. Stress tendon when concrete has achieved 75 percent of required 28-day compression strength. Do not trim tendons until Engineer has approved stressing logs. Additional stressing shall be performed as required by Engineer and is incidental to the work.
- n. Install patch concrete at stressing pocket and splice coupling locations.
- o. Refer to Division 03 Section "Unbonded Post-Tensioned Concrete" for additional requirements.

WI 21.1 INSPECT P/T TENDONS

A. Scope of Work

- 1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to remove and restore concrete slabs to their original condition to provide an inspection opening and expose existing tendons as identified on Detail 21.1 for Engineer review of damage or deterioration. Each inspection opening shall be approximately 3' in length and approximately 1' wide. Refer to Detail 21.1 for specific requirements.
- 2. All concrete work associated with the inspection is incidental to W.I 21.1. Refer to W.I. series 3.0 for similar concrete requirements. Contractors shall not be reimbursed for inspection openings that are larger than 3' x 1', and shall not be double paid under W.I. series 3.0.
- 3. Engineer shall observe all inspection openings prior to continuing with large scale concrete removals or post-tensioning repairs. Contractor shall include labor for a P/T superintendent, who will be performing the P/T repairs, to review and test each tendon exposed within each inspection opening with the Engineer to determine the final P/T repair work scope. Coordinate all inspections with the Engineer and P/T Superintendent.

4. This work shall be performed and paid for on a per Each inspection opening basis. Each inspection opening could have one or multiple tendons within the inspection opening. Contractor will not be paid for each tendon within the inspection openings.

B. Materials

1. Concrete and Reinforcing Materials shall be as specified in Section "Cast-in-Place Concrete".
2. Refer to Section "Unbonded Post-Tensioning Repairs".

C. Execution

1. Remove concrete at tendon locations in accordance with Work Item series 3.0 sufficient to permit clear viewing of the tendons. Remove concrete only to expose tendons, do not remove concrete below tendons.
2. Remove existing plastic sheathing, clean exposed tendon and apply marking paint as directed by the Engineer in the field for inspection and document all P/T conditions. Notify Engineer at least 48 hours before exposing tendons, do not patch exposed tendon until Engineer's inspection is complete and Engineer gives approval to proceed with patching.
3. Clean and epoxy coat exposed reinforcing steel and anchor plate per Work Item Series 3.0.
4. Repairing damaged P/T sheathing and greasing exposed tendons after Engineering inspection is incidental. Refer to W.I. 21.2.
5. Re-cast concrete at inspection locations in accordance with Work Item series 3.0 to match surrounding concrete. Concrete work is performed and paid for under this work item.

WI 21.2 PROTECT EXPOSED P/T TENDON(S)

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove damaged tendon sheathing, re-grease (or epoxy coat tendons as approved by Engineer) in damaged area and install new sheathing. Concrete work performed in association with this work will be paid separately under Work Item series 3.0. Refer to Detail 21.20 for specific requirements.
2. This Work Item applies to Parking Structure #4, and is incidental to all other related P/T work and is not a separate pay item.

B. Materials

1. Material shall be as specified in Division 03 Section "Unbonded Post-Tensioning Repairs."

C. Execution

1. Remove damaged sheathing materials from exposed tendon.
2. Grease coating:
 - a. Apply additional corrosion-inhibiting grease over the damaged area to completely fill any void or surface depression caused by the sheathing damage.
3. Epoxy coating option (use only as approved by Engineer).
 - a. Clean tendon to remove grease residue from exposed tendon.
 - b. Apply uniform coating of epoxy to exposed tendon.
4. Install split sheathing over exposed tendon. Sheathing shall overlap existing sheathing by at least two inches at each end. Sheathing shall be oriented such that the split is toward the bottom.
5. Tape entire length of repair, spirally wrapping tape around sheathing to provide at least two layers of tape. Taping shall overlap existing sheathing by 2 in. at each end.

WI 21.3 P/T TENDON ANCHORAGE (LIVE)

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove existing tendon anchorage system, install new reinforcement, install new tendon anchorage system, and re-tension tendon to required stresses. Concrete repair work is not part of this Work Item. Concrete work performed in association with this work will be paid separately under Work Item series 3.0. Refer to Detail series 21.3 for specific requirements.
2. This Work Item applies to PS#4, and is payable per each live-end anchor repaired.

B. Materials

1. Refer to Work Item 21.0 "P/T System Repair - Monostrand", Article "Materials" and Division 03 Section "Unbonded Post-Tensioning Repairs."

C. Execution

1. De-tension any remaining wires in tendons designated for repair. Remove existing end anchorage system.
2. Install new plastic-coated steel end anchor and install epoxy coated reinforcement as shown in Details at stressing side of end anchor.
3. Grease and wrap new or existing tendon at end anchor repair area in accordance with Work Item 21.2 and is incidental to this work.

4. Place concrete at stressing side of end anchor. After concrete has reached specified strength, tension tendon to specified stresses and lock off. (Restressing due to tendon lock-up or additional tendon failures during stressing is payable per W.I. 21.5).
5. After engineer has approved stressing records, install epoxy coated reinforcement and place concrete at non-stressing side of end anchor.
6. Refer to Work Item 21.0 and Division 03 Section "Unbonded Post-Tensioned Concrete" for additional requirements.

WI 21.4 P/T TENDON END ANCHORAGE (DEAD)

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove existing tendon anchorage system, install reinforcement, and install new tendon anchorage system. Stressing of the tendon is not part of this work but will occur at a different location along the tendon per Work Item 21.3, Work Item 21.5 or Work Item 21.6. Concrete work performed in association with this work will be paid separately under Work Item series 3.0. Refer to Detail series 21.4 for specific requirements.
2. This Work Item applies to PS#4, and is payable per each dead-end anchor repaired

B. Materials

1. Refer to Work Item 21.0 "P/T System Repair - Monostrand" and Division 03 Section "Unbonded Post-Tensioning Repairs."

C. Execution

1. De-tension any remaining wires in tendons designated for repair. Remove existing end anchor.
2. Install new plastic-coated end anchor and install epoxy coated reinforcement as shown in Details.
3. Grease and wrap new or existing tendon at end anchor repair area in accordance with Work Item 21.2 and is incidental to this work.
4. Place concrete in repair area. After concrete has reached specified strength, tension tendon to specified stresses. Stressing operations is not included in Work Item 21.4.
5. Refer to Work Item 21.0 and Division 03 Section "Unbonded Post-Tensioning Repairs" for additional requirements.

WI 21.5 P/T TENDON ANCHORAGE - RESTRESSING

- ##### **A.**
- This Work item applies when cable being stressed per W.I. 21.3 or 21.6 fails. Restressing shall be performed and paid for under this Work Item.

- B. No repair hardware installation is associated with this work item. This Work includes labor and equipment to re-stress tendons that were stressed per W.I. 21.3 or 21.6, and failed or locked up.
- C. See W.I.s 21.3 and 21.6 for stressing requirements.

WI 21.6 TENDON SPLICE COUPLING (CENTER-PULL)

- A. Scope of Work
 - 1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to install a center-pull splice coupling for splicing and stressing of a tendon. Concrete work performed in association with this work will be paid separately under Work Item series 3.0. Refer to Detail series 21.6 for specific requirements.
 - 2. This Work Item applies to PS#4, and is payable per each center-pull coupling repair.
- B. Materials
 - 1. Refer to Division 03 Section "Unbonded Post-Tensioning Repairs."
- C. Execution
 - 1. De-tension any remaining wires in tendons designated for repair.
 - 2. Install center-pull splice coupling onto tendon with required overlap/extension and then stress tendon to specified stress. If this Work Item is performed in combination with other P/T repairs along same tendon, then stress tendon after concrete anchor blocks and patches have achieved the specified compressive strength. Refer to Detail series 21.6 for specific requirements.
 - 3. Epoxy coat coupling prior to installation of repair concrete.
 - 4. Grease and wrap new and existing tendons in repair area in accordance with Work Item 21.2 and is incidental to this work.
 - 5. Refer to Work Item 21.0 and Division 03 Section "Unbonded Post-Tensioning Repairs" or additional requirements.

WI 21.7 TENDON SPLICE COUPLING (SINGLE)

- A. Scope of Work
 - 1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to install one tendon splice coupling and a length of new P/T tendon as Detailed. Concrete work performed in association with this work will be paid separately under Work Item series 3.0. Refer to Detail series 21.7 for specific requirements. This work is performed in conjunction with either Work Item 21.3, Work Item 21.5 or Work Item 21.6.

2. This Work Item applies to PS#4, and is payable per each single splice coupling repair.

B. Materials

1. Refer to Division 03 Section "Unbonded Post-Tensioning Repairs."

C. Execution

1. Install new splice coupling assembly onto unstressed existing tendon. Extend the new tendon to the stressing location. If tendon splice length is greater than that indicated on Detail, then Contractor shall be paid for additional length of Tendon per Work Item 21.9.
2. Epoxy coat all exposed splice coupling assembly prior to installation of repair concrete.
3. Grease and wrap new and existing tendon at tendon splice repair area in accordance with Work Item 21.2 and is incidental to this work.
4. Refer to Work Item 21.0 and Division 03 Section "Unbonded Post-Tensioning Repairs" for additional requirements.

WI 21.8 TENDON SPLICE COUPLING (DOUBLE)

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to install two tendon splice couplings and a length of new P/T tendon as Detailed. Concrete work performed in association with this work will be paid separately under Work Item series 3.0. Refer to Detail series 21.8 for specific requirements. This work is performed in conjunction with either Work Items 21.3, 21.5 or 21.6.
2. This Work Item applies to PS#4, and is payable per each double splice coupling repair.

B. Materials

1. Refer to Division 03 Section "Unbonded Post-Tensioning Repairs."

C. Execution

1. Install new splice couplings onto unstressed existing tendons and connect to new tendon. If tendon splice length is greater than that indicated on Detail, then Contractor shall be paid for additional length of Tendon per Work Item 21.9.
2. Epoxy coat all exposed splice couplings prior to installation of repair concrete.
3. Grease and wrap new and existing tendon at tendon splice repair area in accordance with Work Item 21.2 and is incidental to this work.
4. Refer to Work Item 21.0 and Division 03 Section "Unbonded Post-Tensioning Repairs" for additional requirements.

WI 21.9 P/T TENDON MATERIAL

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to provide and install new P/T monostrand tendon in Work Items 21.7 and 21.8 where splice lengths are greater than that indicated on Details.
2. This Work Item applies to PS#4, and is payable per lineal foot of qualifying P/T tendon material. Length of P/T tendon material required as incidental to other W.I.s is not applicable for payment under this item.

B. Materials

1. Refer to Division 03 Section "Unbonded Post-Tensioning Repairs."

C. Execution

1. Install new tendon within concrete removal area as needed to replace damaged or defective tendon.
2. Tendon profile shall match existing. Use chairs and tie wire to maintain Tendon position during concrete placement.
3. Refer to Work Item 21.0 and Division 03 Section "Unbonded Post-Tensioning Repairs" for additional requirements.
4. Payment under this Work Item not applicable for new tendon indicated as incidental to other Work Items.

WI 25.1 MECHANICAL / ELECTRICAL ALLOWANCE

A. Scope of Work

1. M / E allowance shall be all related utility work (drain lines, sprinkler lines, electrical conduit, junction boxes, etc.) associated with interruptions of these utilities to repair existing structural areas.
2. Work ineligible for allowance includes Work covered by or incidental to Work Items within this Specification or for Work required through Contractor's negligence.

B. Method of Payment

1. Allowance work as approved in writing by Engineer/Architect prior to implementation, shall be paid for by Contractor. Contractor shall provide written documentation of costs for work performed, including invoices from subcontractors with any General Contractor's markup, to Engineer/Architect with each pay request. Contractor shall attach documentation and invoices to written authorization. At completion of project, any variation between allowance and

actual cost documentation will be reflected in an adjustment of allowance amount.

2. Only work that has been pre-approved by Owner/Engineer will be eligible for payment under this Allowance.

WI 25.2 MECHANICAL - REPLACEMENT FLOOR DRAIN

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to replace existing floor drains. Work Item 25.3, "Mechanical - Pipe and Hangers" is directly related to this Work Item. Refer to Detail 25.2 for specific requirements.
2. This Work Item applies to Parking Structure #2, and is payable per each replacement drain.

B. Materials

1. Approved materials for this Work are as shown on Detail 25.2.
2. Sealant materials shall be as specified in Division 07 Section "Concrete Joint Sealants."

C. Execution

1. Contractor shall locate and mark all areas where replacement floor drains are to be installed.
2. Contractor shall verify low points on slab by ponding or elevation survey prior to locating drains.
3. Concrete removals shall be performed by chipping hammers. Do not damage any embedded reinforcement or conduit/wiring. Coring not allowed.
4. Concrete work shall be as shown on Detail 25.2 and as specified in Work Item 3.0 (payable under W.I. Series 3.0 items).
5. Drains shall be installed as shown on Detail 25.2. Set new drains at existing elevation, or adjust to promote/improve existing drainage. Confirm with Engineer prior to placing concrete.

WI 25.3 MECHANICAL - PIPE AND HANGERS

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to connect drains or replace existing piping by installing new pipe and hangers. Work Item 25.2 is directly related to this Work Item. Refer to Detail 25.3 for specific requirements.

2. This Work Item applies to Parking Structures #2 and #4, and is payable per lineal foot of repair performed.

B. Materials

1. New piping: Schedule 80 PVC, 4" diameter.
2. Stainless steel hangers/connections and anchors.

C. Execution

1. Contractor shall locate and mark all areas where floor drain piping is to be replaced.
2. Remove existing piping in manner to not damage surrounding construction. Salvage existing hangers if in good condition, or remove and install new (incidental). Obtain Engineer approval of existing hangers being salvaged.
3. Pipes and hangers shall be installed as tight to ceiling as possible, but with adequate positive drainage slope at all locations along pipe runs. Confirm in field with Engineer.
4. Pipes and hangers shall be installed as shown on Detail 25.3 and in accordance with referenced specification section.
5. Confirm installation requirements in field with Engineer.

WI 25.4 REPLACE SUPPLEMENTAL DRAIN

- A. Refer to Work Item 25.2 for similar scope of Work, materials, and procedures associated with this Work Item.
- B. This Work Item applies to Parking Structure #4, and is payable per each drain replaced.
- C. Replace existing 6" diameter floor drain with equivalent heavy-duty, cast-iron, 6" diameter floor drain by Smith, Wade, or Engineer-approved equivalent. Install piping per W.I. 25.3 to connect new drain to existing drainage system.
- D. Concrete replacement and supplemental reinforcement required on Detail 25.2 to be paid for under W.I. Series 3.0.

WI 25.5 MECHANICAL – SUPPLEMENTAL DRAINS (ALTERNATE)

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to install supplemental floor drains at areas of ponding water at general locations shown on plans. Alternate Work Items 3.7, 25.6, and 25.7 are directly related to this Work Item. Refer to Detail 25.5 for specific requirements.

2. This Alternate Work Item, if accepted, applies to Parking Structure #4, and is payable per each supplemental drain installed.

B. Materials

1. Approved materials for this Work are as shown on Detail 25.5.
2. Concrete repair materials shall be as specified in Section "Cast-in-Place Concrete" and Section "Pre-packaged Repair Mortar".
3. Sealant materials shall be as specified in Division 07 Section "Concrete Joint Sealants."

C. Execution

1. Contractor shall locate and mark all areas where supplemental floor drains are to be installed.
2. Contractor shall perform elevation survey to locate low points of ponding areas to confirm location of supplemental drains (incidental). Submit proposed drain locations and drainage plan to Engineer for approval prior to start of Work.
3. Supplemental drains shall be located to not interfere with embedded reinforcement/tendons, existing conduit, or concrete beam below. Confirm in field with Engineer.
4. Locate embedded post-tensioning system elements prior to concrete removals.
5. Concrete removals shall be performed by chipping hammers. Do not damage any embedded reinforcement or post-tensioning system elements. Coring not allowed.
6. Concrete work shall be as shown on Detail 25.5 and as specified in Work Item Series 3.0. All concrete work and supplemental reinforcement required on Detail 25.5 shall be included in unit price for this Work Item, not to be double-billed under W.I. Series 3.0.

**WI 25.6 MECHANICAL – VERTICAL PIPING STACKS (FOR ALT. W.I. 25.5)
(ALTERNATE)**

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to install new vertical piping stacks from level 8 floor slabs to grade, and terminate at grade as described in this Work Item. Alternate Work Items 3.7, 25.5, and 25.7 are directly related to this Work Item. Refer to Detail 25.6 for specific requirements.
2. This Alternate Work Item, if accepted, applies to Parking Structure #4. Payment shall be per each location of vertical piping installed, including coring through floor slabs.

B. Materials

1. New piping: Schedule 80 PVC, 4" diameter.
2. Stainless steel hangers/connections and anchors.

C. Execution

1. Install vertical piping rainwater collector stacks at (2) locations as shown on plans (one at south end and one at north end of structure, from level 8 floor slabs to grade) to connect new supplemental drains per Alt. W.I. 25.5.
2. Install stainless steel hangers/connections at regular intervals per code requirements and industry standards (minimum 3 per level).
3. Incidental to this Work: Core through floor slabs (levels 2-7 at north end, levels 3-7 at south end) to install new vertical stacks to connect new supplemental drains from level 8 to grade. Diameter of cores shall be as small as possible to allow installation of new 4" piping. Confirm with Engineer in field. Install sealant and backer rod at perimeter of openings (incidental).
4. Install new piping tight to concrete columns. Locate cores in floor slabs as tight as possible to edge of beams on underside of slabs (verify in field).
5. Locate cores to not interfere with embedded post-tensioning system elements and/or adjacent conduit runs.
6. Changes in direction of vertical stacks shall be performed by installing piping 45 deg from vertical (no horizontal runs allowed). Confirm in field with Engineer prior to start of Work.
7. Terminate new piping at grade level as follows:
 - a. At the north end of the structure, cut a small penetration through existing perimeter metal grating and route piping to the exterior of the structure. Submit shop drawings for approval prior to start of Work.
 - b. At the south end of the structure, provide French drain at grade level just outside of the structure, and install piping minimum 42" below grade.
 - 1) French Drain: 4-ft. diameter hole x 7-ft. deep. Line with geo-textile fabric and fill with pea-stone. Locate buried utilities prior to start of Work and confirm location of French drain in field with Owner/Engineer prior to start of Work. Install new PVC piping in center of French drain hole, minimum 42" below grade.

WI 25.7 MECHANICAL - PIPE AND HANGERS (FOR ALT. W.I. 25.5) (ALTERNATE)

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to install new piping from supplement drains (Alt. W.I. 25.5) to new vertical stacks (Alt. W.I. 25.6). Work Items 3.7, 25.5, and 25.6 are directly related to this Work Item. Refer to Detail 25.7 for specific requirements.
2. This Alternate Work Item, if accepted, applies to Parking Structure #4, and is payable per lineal foot of new piping installed.

B. Materials

1. New piping: Schedule 80 PVC, 4" diameter.

2. Stainless steel hangers and anchors.

C. Execution

1. Contractor shall locate and mark all areas where floor drain piping is to be installed.
2. Pipes and hangers shall be installed with adequate positive drainage slope at all locations along pipe runs.
3. Pipes and hangers shall be installed as shown on Detail 25.7 and in accordance with referenced specification section. Confirm installation requirements in field with Engineer.

WI 40.1 SUPPLEMENTAL SHEAR CONNECTORS (ALTERNATE)

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to install new shear connectors as indicated on the Drawings. Refer to Detail 40.1 for specific requirements.
2. This Alternate Work Item applies to Parking Structure #6, and if accepted, is payable per each supplemental shear connector installed

B. Materials

1. Angle shall be galvanized ASTM A36 steel or Grade 304 stainless steel.
2. Anchor bolts and all hardware shall be the same type and finish of steel as the angles above.
3. Anchoring system shall be as shown on the referenced detail.
4. Slide Bearing Pads: Ultrahigh molecular weight, high-density polyethylene resin. Acceptable material is "Korolath PE" by Koro Corporation, Hudson, Massachusetts.

C. Execution

1. Contractor shall locate broken tee flange shear connections in field with Engineer.
2. Drilling shall be performed in manner to prevent concrete spalling (submit proposed method for Engineer approval). Concrete spalling shall be repaired by Contractor at no additional cost, utilizing repair methods acceptable to Engineer.

WI 41.1 STAIR REPAIR – LANDINGS

- A. Refer to Work Item "Concrete Floor Repair" for similar scope of Work, materials, and procedures. See Detail 41.1 for specific requirements.
- B. This Work Item applies to Parking Structure #2. Verify requirements in field prior to submitting Bid. Payment shall be per square foot of repair performed.

WI 41.2 STAIR REPAIR – TREADS

- A. Refer to Work Item “Concrete Floor Repair” for similar scope of Work, materials, and procedures. See Detail 41.2 for specific requirements.
- B. This Work Item applies to Parking Structure #2. Verify requirements in field prior to submitting Bid. Payment shall be per each tread repaired.

WI 42.3 INSTALL STAIR TREAD PLATES (ALTERNATE)

- A. Scope of Work
 - 1. This Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to install stair tread plates over existing stair treads. See Detail 42.3 for specific requirements.
 - 2. This Alternate Work Item applies to Parking Structure #4, and if accepted, is payable per each stair tread installed.
- B. Materials
 - 1. Galvanized steel stair tread cover by SlipNOT Safety Flooring, Detroit, MI (313-923-0400) sized to fit, or Engineer approved equivalent. Match previously-installed tread plates to Owner/Engineer satisfaction. Submit samples for approval.
 - 2. Welding Electrodes shall be E70XX. All welding shall be per AWS D1.1, latest edition.
 - 3. Touch-up paint for tread plate shall be ZRC Cold Galvanizing compound, or approved equivalent.
 - 4. Paint for existing stringers shall be exterior/industrial grade primer and paint. Color to match existing. Submit sample to Owner for approval prior to start of Work.
 - 5. Sealants shall be per Section “Concrete Joint Sealants”.
- C. Execution
 - 1. Location of repairs shall be as indicated on plans. Confirm in field with Engineer.
 - 2. Clean steel stair stringer of all surface rust and paint at areas to be welded to provide clean welding surface.
 - 3. Contractor shall be responsible to field-bend and/or remove existing deteriorated steel tread nosings as needed to install new treads (incidental). Verify in field with Engineer prior to performing removals or repairs.
 - 4. Install stair tread plate over existing tread tight to riser and tread surface.
 - 5. Stitch weld stair tread plate to stringer using electrodes for welding galvanized steel (minimum 2 welds at each end of each tread, and 4 welds along back of each tread; locate/confirm in field with Engineer). Clean welds by grinding and provide paint to match existing. Cover all exposed stringer steel with industrial/exterior rated paint, intended for steel.
 - 6. Touchup paint steel stringers at welded areas to match existing color.

7. Install sealant around perimeter of new tread plates (incidental).

WI 45.1 PAINT TRAFFIC MARKINGS

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to locate, layout, and paint parking stall stripes, traffic arrows, crosswalks, accessible stall access aisles, curbs, symbols, stop bars and all other existing pavement markings upon completion of all repairs.
2. Payment for this Work Item shall be lump sum at PS#2, PS#4, and PS#6 to perform traffic marking installation in all areas of the structure where existing markings are affected by Project including, but not limited to:
 - a. Concrete floor repair locations.
 - b. Locations of sealant replacement.
 - c. Epoxy/sand repair areas.
 - d. Traffic Topping Work.
 - e. Areas where dust/debris have accumulated.
 - f. Contractor staging/storage/parking areas.
 - g. Traffic markings affected by debris removal, cleanup procedures, equipment/material storage, construction traffic, deliveries, etc.
3. This Work Item applies to Parking Structures #2, #4, and #6.
4. This Work also includes painting delineation strips at stair tread nosings in both stair towers at PS#2.
5. Traffic markings shall match all existing markings and be provided at same locations. Contractor shall be responsible for verifying and recording existing traffic marking layout prior to start of Work.
6. Perform this work during off-hours and/or on weekends (incidental) after all other repairs have been completed as necessary to not close additional parking spaces during normal daytime hours. Comply with parking space closure requirements as specified on Drawings.
7. New traffic markings shall be installed in all work areas prior to re-opening for normal use.
8. Remove existing stripes in those locations where they conflict with new striping layout.
9. Any traffic markings required due to any Alternate Work, if accepted, shall be incidental and included in the unit price of the Alternate Work Items. No extras allowed.

B. Materials

1. Traffic marking materials shall be as specified in Section "Pavement Marking".

C. Execution

1. Contractor shall prepare drawing of existing parking and traffic marking layout in repair areas prior to starting with repairs. Contractor shall note stall width, angle of parking, directional traffic arrows and all other existing pavement markings.
2. Contractor shall submit traffic marking plan for Owner/Engineer's approval prior to installing any markings.
3. Contractor shall match existing traffic marking layout, except as directed otherwise by Owner/Engineer.
4. Where existing pavement markings conflict with new striping layout, remove conflicting pavement markings as indicated in Division 9 Section "Pavement Marking".
5. Engineer shall inspect all layout and surface preparation for conditions in accordance with Section "Pavement Marking."
6. All procedures shall be in accordance with Section "Pavement Marking".

WI 45.2 COAT EXPOSED REBAR (ALTERNATE)

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate, prepare surface, and coat locations of exposed rebar on concrete surfaces. Refer to Detail 45.2 for specific requirements.
2. This Work Item applies to Parking Structure #2. Payment shall be per each location (which consists of all exposed rebar along bumper walls between column lines – work area at each location is roughly 24 L.F.). Contractor to verify requirements in field prior to submitting Bid.

B. Materials

1. Sika Armatec 110 EpoCem, or approved equivalent.

C. Execution

1. Contractor shall locate Work areas in field with Engineer.
2. Contractor shall prepare surface to be coated in accordance with manufacturer's recommendations.

WI 45.3 COAT TOP OF BUMPER WALLS (ALTERNATE)

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate, prepare surface, and coat locations of exposed rebar on concrete surfaces. Refer to Detail 45.3 for specific requirements.
2. This Alternate Work Item applies to Parking Structure #2. Payment (if accepted) shall be per each location (work area at each location is roughly 24 L.F.). Contractor to verify requirements in field prior to submitting Bid.

B. Materials

1. AllGuard Silicone Elastomeric Coating, by Dow Corning.
2. Engineer-approved equivalent.
3. Provide mockup for Owner approval prior to proceeding.

C. Execution

1. Contractor shall locate Work areas in field with Engineer.
2. Contractor shall prepare surfaces to be coated in accordance with manufacturer's recommendations.

WI 45.4 PAINT CONCRETE BEAMS & WALLS (ALTERNATE)

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate, prepare surfaces, and paint existing concrete beams and walls at locations identified on plans.
2. This Alternate Work Item, if accepted, applies to Parking Structure #4, and is payable per square foot of painting performed.

B. Materials

1. Paint materials shall be as specified in Section "Exterior Painting".

C. Execution

1. Contractor shall locate and layout Work areas as indicated on Drawings.
2. Contractor shall prepare surface to be painted in accordance with manufacturer's recommendations and Section "Exterior Painting".
3. Submit samples for Owner approval of color. Install mockups for approval prior to proceeding with full scale operations.

WI 45.5 PAINT – STEEL CONNECTIONS

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate, prepare surfaces, and paint existing steel connections on levels 8 & 9.
2. This Alternate Work Item, if accepted, applies to Parking Structure #4, and is payable per each connection painted (size/configuration of connections vary).

B. Materials

1. Paint materials shall be as specified in Section “Exterior Painting”.

C. Execution

1. Contractor shall locate and layout Work areas as indicated on Drawings.
2. Contractor shall verify requirements in field prior to submitting Bid. Intent is to clean and paint all steel precast connections exposed to the sky on levels 8 & 9 (roughly 300 total connections). Some locations require means of access and fall protection (incidental).
3. Contractor shall prepare surface to be painted in accordance with manufacturer's recommendations and Section “Exterior Painting”.
4. Submit samples for Owner approval of color. Install mockups for approval prior to proceeding with full scale operations.

END OF SECTION 020010

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SECTION 025130 - GENERAL CONCRETE SURFACE PREPARATION

PART 1 - GENERAL

1.1 DEFINITIONS

- A. **DELAMINATIONS:** Fracture planes, "internal cracks", within concrete. Typically, these fractures are parallel to the member face and vary in depth.
- B. **NEAR-VERTICAL CHIPPED EDGES:** Provide an edge dressed to within 20 deg of perpendicular of finished surface.
- C. **SPALLS:** Potholes, cavities, or voids in concrete. Usually result of delamination migrating to face of concrete member. When fracture finally reaches surface, concrete encompassed by delamination breaks away, resulting in spall.
- D. **UNSOUND CONCRETE:** Concrete exhibiting one or more of:
 - 1. Incipient fractures present beneath existing delaminated or spalled surfaces.
 - 2. Honeycombing.
 - 3. Friable or punky areas.
 - 4. Deterioration from freeze-thaw action.
- E. **SCALING:** Deterioration which attacks mortar fraction (paste) of concrete mix. First appears as minor flaking and disintegration of concrete surface. Scaling eventually progresses deeper into concrete, exposing aggregate which breaks away.
- F. **SHOTBLASTING:** Scarification of concrete surfaces using an abraded metal shot-rebound. See ICRI Guideline 03732 "Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays".

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 025130

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SECTION 025140 - SURFACE PREPARATION FOR PATCHING AND OVERLAY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the provision of all labor, materials, equipment, supervision, and incidentals necessary to locate and remove all delaminated and unsound concrete, all existing failed patches, all existing surface spalls and potholes, and preparation of cavities created by removal to receive concrete patching material.

1.3 REFERENCES

- A. "Specifications for Structural Concrete for Buildings" (ACI 301) by American Concrete Institute, herein referred to as ACI 301, is included in total as specification for this structure except as otherwise specified herein.
- B. Comply with provisions of following codes, specifications, and standards except where more stringent requirements are shown on Drawings or specified herein:
 - 1. "Concrete Repair Guide" (ACI 546R-04).

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 INSPECTION

- A. Floor Slabs:
 - 1. Floor Slab Delaminations: Locate by sounding surface with hammer, rod, or chain drag.
 - 2. When delaminated area is struck, distinct hollow sound is heard.
 - 3. Contractor: Sound all designated floors for delaminations.
 - 4. Certain structural systems that contain thin slab thicknesses with Welded Wire Reinforcement or other small diameter reinforcing, such as waffle slab or precast tees, may have significant deterioration without evidence of delaminations.

These structural systems require qualified personnel to provide additional inspections, primarily visual in nature, to define the extent of deterioration.

5. Contractor: Visually inspect thin slab thicknesses with small diameter reinforcing for deterioration.

B. Vertical and Overhead Surfaces:

1. Vertical and Overhead Surface Delaminations: Locate by sounding appropriate member with hammer or rod.
2. Cracks, usually horizontal in orientation along beam faces, and vertical in orientation near column corners are indicators of delaminated concrete.
3. Contractor: Sound only vertical and overhead surfaces that show evidence of cracking and/or salt and water staining.

- C. Delaminated areas, once located by Contractor, shall be further sounded to define limits. Mark limits with chalk or paint.

- D. Contractor: Locate spalls by visual inspection and mark boundaries with chalk or paint after sounding surface.

- E. Engineer/Architect will define and mark additional unsound concrete areas for removal, if required.

- F. Areas to be removed shall be as straight and rectangular as practical to encompass repair and provide neat patch.

- G. Contractor: Locate and determine depth of all embedded REINFORCEMENT, POST-TENSIONING TENDONS, and ELECTRICAL CONDUIT/WIRING in repair area and mark these locations for reference during concrete removal. Do **NOT** nick, cut, or damage any embedded items.

1. Contractor shall locate embedded conduit/electrical wiring using radio detection methods, or other methods used in the industry to positively identify any embedded conduit/wiring prior to start of concrete removals or saw-cutting.

3.2 PREPARATION

- A. **Temporary shoring may be required at concrete floor repair areas and at any beam, joist, or column repair. Contractor: Review all marked removal and preparation areas and request clarification by Engineer/Architect of shoring requirements in questionable areas. Shores shall be in place prior to concrete removal and cavity preparation in any area requiring shores.**

- B. Delaminated, Spalled, and Unsound Concrete Floor Areas: Mark boundaries. All concrete shall be removed from within marked boundary to minimum depth of 0.75 in. using 15 to 30 lb chipping hammers equipped with chisel point bits. When directed by Engineer/Architect, chipping hammers less than 15 lb shall be used to minimize damage to sound concrete. Near vertical chipped edge shall be provided along perimeter of repair area where shown on drawings. Areas to be removed shall

encompass repair and provide uniform cavity surface. If delaminations exist beyond minimum removal depth, chipping shall continue until all unsound and delaminated concrete has been removed from cavity.

1. All work shall comply with OSHA Crystalline Silica Requirements.
- C. Where embedded reinforcement or electrical conduit is exposed by concrete removal, exercise extra caution to avoid damaging it during removal of unsound concrete. If bond between exposed embedded reinforcement and adjacent concrete is impaired by Contractor's removal operations, Contractor shall perform additional removal around and beyond perimeter of reinforcement for minimum of 0.75 in. along entire length affected at no cost to Owner.
- D. If rust is present on embedded reinforcement where it enters sound concrete, additional removal of concrete along and beneath reinforcement required. Additional removal shall continue until non-rusted reinforcement is exposed, or may be terminated as Engineer/Architect directs.
- E. Sawcut patch and overlay boundaries to depth of 0.75 in. into floor slab, unless otherwise noted. No sawcutting required at overlay boundaries abutting existing vertical surface (wall, beam, curb, etc.). For vertical and overhead surfaces marked boundary may be sawcut, ground or chipped to depth of 0.5 in. to 0.625 in. into existing concrete, measured from original surface. All edges shall be straight and patch areas square or rectangular-shaped. Diamond blade saw or grinder with abrasive disk suitable for cutting concrete is acceptable for performing work. Edge cut at boundary shall be dressed perpendicular to member face. It shall also be of uniform depth, for entire length of cut. Exercise extra caution during sawcutting to avoid damaging existing reinforcement (ESPECIALLY POST-TENSIONING TENDONS AND SHEATHING) and electrical conduit/wiring and any other embedded items near surface of concrete. Any damage to existing reinforcement, post-tensioning tendons or sheathing, or electrical conduit/wiring during removals shall be repaired by Contractor with Engineer/Architect-approved methods at no additional cost to Owner.
- F. All sound surfaces (surfaces not requiring spall or delamination repair as previously discussed in this section) to receive concrete repairs or overlay shall be heavy abrasive blasted or heavy shotblasted prior to overlay placement, to produce a final concrete surface profile matching ICRI CSP recommendations.

3.3 INSPECTION OF REPAIR PREPARATION

- A. After removals are complete, but prior to final cleaning, exposed concrete surfaces and exposed reinforcement shall be inspected by Contractor and verified by Engineer/Architect for compliance with requirements of this Section. Where Engineer/Architect finds unsatisfactory surface or cavity preparation, Engineer/Architect shall direct Contractor to perform additional removals. Engineer/Architect shall verify areas after additional removals.
- B. Contractor shall inspect embedded reinforcement and conduits exposed within cavity for defects due to corrosion or damage resulting from removal operations. Contractor

shall notify Engineer/Architect of all defective and damaged reinforcement or conduits. Replacement of damaged or defective reinforcement or conduits shall be performed according to this Section and as directed by Engineer/Architect.

- C. After inspections of exposed surfaces and reinforcement are complete, Engineer/Architect and Contractor shall measure and document removal and replacement quantities for payment, as required.

3.4 REINFORCEMENT AND EMBEDDED MATERIALS IN REPAIR AREAS

- A. All embedded reinforcement exposed during surface preparation that has lost more than 15% (10% if 2 or more consecutive parallel bars and/or tendons are affected) of original cross-section due to corrosion shall be considered DEFECTIVE. All non-defective exposed reinforcement that has lost section to extent specified above as direct result of Contractor's removal operations shall be considered DAMAGED.
- B. **Embedded materials** including, but not limited to, electrical conduit, corrosion protection systems and snow/ice melting equipment **shall be protected by Contractor** during removal operations. **Damage due to removal operations shall be repaired by Contractor in accordance with national code requirements at no cost to Owner.** Embedded materials which are defective due to pre-existing conditions may be repaired or replaced by Contractor or abandoned at Owner's option and cost.
- C. Supplement defective or damaged embedded reinforcement by addition of reinforcement of equal diameter with Class "B" minimum splice per ACI 318 beyond damaged portion of reinforcement. Secure new reinforcement to existing reinforcement with wire ties and/or approved anchors. Supplemental reinforcement shall be ASTM A615 Grade 60 steel installed in accordance with Division 03 specification Sections. Tendon supplement or repair materials, when applicable, shall be as required by Section "Work Items."
- D. Loose and supplemental reinforcement exposed during surface preparation shall be securely anchored prior to concrete placement. Loose reinforcement shall be adequately secured by wire ties to bonded reinforcement or shall have drilled-in anchors installed to original concrete substrate. Drilled-in anchors shall be Powers "Tie-Wire Lok-Bolt" anchors, ITW Ramset/Red Head "TW-1400" anchor, or approved equivalent. Supplemental reinforcing needed to be held off substrate shall be adequately secured by drilled-in anchors installed to original concrete substrate with Powers "Tie-Wire Spike", ITW Ramset/Red Head Redi-Drive "TD4-112" anchors, or approved equivalent. Engineer/Architect will determine adequacy of wire ties and approve other anchoring devices prior to their use. Securing loose and supplemental reinforcement is incidental to surface preparation and no extras will be allowed for this Work.
- E. Concrete shall be removed to provide minimum of 3/4 in. clearance on all sides of defective or damaged exposed embedded reinforcement that is left in place. Minimum of 1.5-in. concrete cover shall be provided over all new and existing reinforcement. Concrete cover over reinforcement may be reduced to 1 in. with Engineer/Architect's approval if coated with an approved epoxy resin.

- F. Supplemental reinforcement and concrete removals required for repairs of defective or damaged reinforcement shall be paid for as follows:
1. Concrete removals and supplemental reinforcement required for repairs of DEFECTIVE reinforcement shall be paid for by Owner at unit price bid.
 2. Concrete removals and supplemental reinforcement required for repairs of DAMAGED reinforcement shall be paid for by Contractor.

3.5 CLEANING OF REINFORCEMENT WITH DELAMINATION AND SPALL CAVITIES

- A. All exposed steel shall be cleaned of rust to bare metal by sandblasting. Cleaning shall be completed immediately before concrete placement to ensure that base metal is not exposed to elements and further rusting for extended periods of time. Clean entire bar diameter be cleaned.
- B. After all sandblasting operations and cleanup are completed, paint all exposed steel with an approved epoxy. Protect prepared surfaces from damage prior to and during concrete placement.

3.6 PREPARATION OF CAVITY FOR PATCH PLACEMENT

- A. Floor slab and cavity surfaces will be examined prior to commencement of concrete placement operations. Sounding surface shall be part of examination. Any delamination noted during sounding shall be removed as specified in this Section.
- B. Cavities prepared by chipping or other impact methods shall be sandblasted to remove material that may impair concrete bonding. Sound concrete surfaces shall be prepared by shotblasting as previously specified in this section. Airblasting is required as final step to remove all debris including sand and dust. All debris shall be removed from site prior to commencement of concrete placement, bonding agent preparation, etc. as specified in Division 03 Sections.

END OF SECTION 025140

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SECTION 032117 – GALVANIC ANODE CORROSION PROTECTION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes furnishing all labor, tools, materials, equipment, and services necessary to properly install embedded galvanic anodes.
- B. Embedded galvanic anodes are designed to provide localized corrosion protection to mild steel reinforcement that is located within a partial or full depth concrete repair. When placed at appropriate spacing, as recommended by the product manufacturer, along the perimeter of concrete patches or interface between new and existing concrete, galvanic anodes help control active corrosion and mitigate formation of new corrosion sites.

1.3 SUBMITTALS, GENERAL

- A. Provide submittals in accordance with Division 01 Sections.
 - 1. Submit material samples of anode(s) and related materials at least 14 days in advance of installation.
 - 2. Submit 3 copies of verifiable 5-year history of projects.
 - 3. Submit 3 copies of material testing report from independent laboratory verifying chloride resistance of concrete repair materials per ASTM C1202.
 - 4. Submit 3 copies of Contractor's continuity testing log during installation.
 - 5. Submit 3 copies of manufacturer technical representative's log for each site visit during installation.

1.4 QUALITY ASSURANCE

- A. The contractor shall provide submittals confirming the chloride penetration resistance of the repair material / bridging mortar by an independent testing laboratory prior to beginning work.
 - 1. Concrete repair material / Bridging Mortar shall have a Rapid Chloride Penetration Resistance (ASTM C1202) above 1350 Coulombs or Bulk

Electrical Resistivity (ASTM C1760) below 15,000 Ohm-cm as measured after 28-day wet-cure.

- B. Embedded galvanic anodes shall utilize chemical enhancement to keep the zinc active over the anode design life. Alkali-activated anodes shall have a pH of 14 or greater.
- C. Insulating materials such as epoxy bonding agents shall not be used in any patch or concrete placement protected by galvanic anodes. Verify and coordinate usage and locations with Engineer/Architect prior to placing any repair material.
- D. Testing Agency:
 - 1. Independent testing laboratory provided by Owner and acceptable to Engineer/Architect.
 - 2. Testing laboratory shall submit documented proof of ability to perform required tests.
 - 3. Testing Agency is responsible for conducting, monitoring, and reporting results of all tests required under this Section. Testing Agency has authority to reject material not meeting Specifications.
 - 4. Testing of repair locations shall be performed by testing agency representatives that are NACE certified to CP2, CP3 or CP4.
 - 5. Testing Agency shall submit the following information for Field Testing of Material unless modified in writing by Engineer/Architect:
 - a. Project name and location.
 - b. Contractor's name.
 - c. Testing Agency's name, address and phone number.
 - d. Anode manufacturer.
 - e. Date of report.
 - f. Testing Agency technician's name.
 - g. Placement location within structure.
 - h. Weather data:
 - 1) Air temperatures.
 - 2) Weather.
 - 3) Wind speed.
 - i. Date, time, and place of test.
 - j. Related test data as required in Section "Field Quality Control by Testing Agency."

1.5 REFERENCES

- A. Comply with provisions of following codes, specifications, and standards except where more stringent requirements are shown on Drawings or specified herein:
 - 1. ACI/ICRI: Concrete Repair Manual.
 - 2. ACI Guideline No. 222R: – Corrosion of Metals in Concrete

3. ACI 562: Code Requirements for Evaluation, Repair and Rehabilitation of Concrete Buildings.
4. ACI RAP-8: Repair Application Procedure: Installation of Embedded Galvanic Anodes
5. ICRI Guideline 310.1R: Guide for Surface Preparation for the Repair of Deteriorated Concrete resulting from Reinforcing Steel Corrosion.
6. ASTM A615/A615M: Standard Specification for Deformed and Plain Carbon-Steel Bar for Concrete Reinforcement.
7. ASTM A82: Specification for Plain Steel Wire for Concrete Reinforcement.
8. ASTM B6-09 - Standard Specification for Zinc.
9. ASTM B418: Standard Specification for Cast and Wrought Galvanic Zinc Anodes.
10. ASTM C1202: Standard Test Method for an Electrical Indication of Concrete Ability to Resist Chloride Ion Penetration,
11. ASTM C1760: Standard Test Method for Bulk Electrical Conductivity of Hardened Concrete.”

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all materials to site in original, unopened containers, bearing following information:
 1. Name of product.
 2. Name of manufacturer.
 3. Batch number
 4. Date of manufacture.
- B. Store materials in unopened boxes in dry conditions and protect from extremes in temperature and humidity. Replace packages or materials showing any signs of damage with new material at no additional cost to Owner.

1.7 WARRANTY

- A. System manufacturer and Contractor shall furnish Owner written single source performance guarantee that the embedded galvanic anodes will remain electrochemically active, producing galvanic current and provide corrosion protection for a period of five years starting from the date of substantial completion of the project.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Embedded galvanic anodes shall utilize zinc in compliance with ASTM B418 Type II (Z13000) and ASTM B6 Special High Grade (Z13001) with iron content less than 15 ppm.

- B. Embedded galvanic anodes shall be pre-manufactured, and contain sufficient quantity of metallic zinc to mitigate corrosion for a period of fifteen (15) years. Minimum amount of zinc shall be at least 100 grams. Amount of zinc shall be at least 200% of amount needed to satisfy anticipated service life based on electrochemical theory (Faraday's Law) and based on currents that are expected to flow in anodes. Zinc shall be cast around steel tie wires to provide a durable zinc / steel connection as per NACE practice. Anodes shall be supplied with integral un-spliced tie wires for direct connection to reinforcing steel.
- C. Embedded galvanic anodes shall be evaluated and certified by an independent organization.
- D. Embedded galvanic anodes shall have verifiable record with a minimum of 5 projects of similar size showing minimum five years' satisfactory performance in similar field environment. Records shall demonstrate satisfactory flow of protective current throughout three-year period; including at least 0.2 mA after 1 year, and at least 0.1 mA after 3 years. Significant cathodic polarization of surrounding reinforcing steel shall be documented throughout this period.
- E. Repair mortars, concrete, and bonding agents shall be Portland cement-based materials with volumetric resistivity below 15,000 ohm-cm, as measured after 28-day wet cure and in saturated condition. Contractor shall provide submittals confirming the resistivity of repair materials prior to beginning work. Non-conductive repair materials such as epoxy, urethane, or magnesium phosphate shall not be permitted.
- F. Deformed bars for reinforcement shall be hot-rolled steel in accordance with ASTM A615/A615M-00, Grade 60 (Grade 400).
- G. Deliver, store, and handle all materials in accordance with manufacturer's instructions.
- H. Acceptable Products (Minimum Zinc Content 100 grams) are as follows:
 - 1. Alkali Activated Embedded Galvanic Anodes:
 - a. "Galvashield XP2 or XP4," by Sika Corporation, Lyndhurst, NJ or by Vector Corrosion Technologies, Winnipeg Canada.
 - 2. Halide Activated Embedded Galvanic Anodes:
 - a. "MasterProtect 8105 CP or MasterProtect 8150 CP," by BASF Building Systems, Shakopee, MN.
 - b. "Sentinel-Silver or Gold," by The Euclid Chemical Company.
 - c. "Galvanode VP," by Vector Corrosion Technologies, Winnipeg Canada.
 - d. Product substitutions are not allowed.

PART 3 - EXECUTION

3.1 CONCRETE REMOVAL AND PREPARATION

- A. Concrete removals and preparation of the concrete surfaces for patching shall be conducted under appropriate concrete repair work items and according to Section "Surface Preparation for Patching and Overlay".
- B. Clean bond-inhibiting materials from the concrete substrate by high pressure water blasting or abrasive blasting to provide a sound substrate bonding surface.

3.2 CLEANING AND REPAIR OF REINFORCING STEEL

- A. Clean exposed reinforcing steel of rust, mortar, etc. to provide sufficient electrical connection prior to installation of anodes.
- B. Secure loose reinforcing steel by tying tightly to other bars with steel tie wire. Newly secured reinforcing steel shall be tested to insure electrical continuity according to Section "Galvanic Anode Installation: Electrical Continuity" below.

3.3 GALVANIC ANODE INSTALLATION

- A. Galvanic anodes shall be installed along perimeter of repair or interface with spacing as indicated in Project Documents and in accordance with manufacturer recommendations.
 - 1. In no case shall distance between anodes exceed 24 inches (760 mm).
 - 2. Handle and install anodes in accordance with manufacturer's written instructions.
 - 3. Provide sufficient clearance between anodes and substrate to allow repair material to encase anode.
 - 4. Install galvanic anodes immediately following preparation and cleaning of steel reinforcement.
 - 5. Galvanic anodes shall be installed to provide minimum 2 inches (50 mm) concrete cover over the anodes. If less than 2 inches (50 mm) of concrete cover is expected, place anode behind bar and secure to clean reinforcing steel.
 - 6. Secure galvanic anodes within 4 in (100 mm) of patch edge using anode tie wires, preferably Tie wires shall be wrapped at least one full turn in opposite directions around cleaned reinforcing steel and twisted tight to allow little or no free movement. Anode may be tied to a single bar or may be placed at an intersection between two bars and secured to each clean bar.
- B. Electrical Continuity
 - 1. At all anode locations, Contractor to confirm and report electrical continuity between anode tie wire and reinforcing steel and between exposed reinforcing

steel within the repair area by using a multi-meter on the lowest DC mV scale. Electrical continuity is acceptable if the DC mV difference between test points is equal to or less than 1 mV. Document testing and submit in accordance with Section "Submittals".

2. If electrical continuity does not exist between anode unit and reinforcing steel, remove the anode, clean the steel, reinstall the anode and retest. If electrical continuity does not exist between reinforcing steel within the repair area, connect discontinuous steel to continuous steel by wrapping tightly with steel tie wire to provide electrical continuity.

3.4 CONCRETE REPLACEMENT

- A. Provide bridging mortar as applicable based on manufacturer's recommendations, completely surrounding anode and forming a connection to patch perimeter.
- B. Complete repair in accordance with appropriate work item(s).
- C. Do not damage the anode during concrete replacement or allow anode to be soaked with water greater than 20 minutes.

3.5 FIELD QUALITY CONTROL BY TESTING AGENCY

- A. Field Observations.
 1. Presence of insulating materials.
 2. Confirmation of material type installed.
 3. Confirmation of material spacing and attachment.
 4. Confirmation of material installation in accordance to manufacturer requirements, and as indicated in Contract Documents.
 5. Confirm continuity of at least 10 anode locations or up to 5% of repair quantity identified by the Contractor as ready for concrete placement.

END OF SECTION 032117

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SECTION 033000 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, finishes, and other miscellaneous items related to cast-in-place concrete.
- B. Cast-in-place concrete includes project requirements specified herein and on the drawings:
 - 1. Water/cementitious materials ratio: See General Notes on Drawings.
 - 2. Entrained air: See General Notes on Drawings.
 - 3. Water Reducing Admixture: See Part 2 Article "Admixtures."
 - 4. Compressive Strength: See General Notes on Drawings.

1.3 DEFINITIONS

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

1.4 SUBMITTALS

- A. Make submittals in accordance with requirements of Division 01 Sections.
- B. Submittals and Resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal data the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including the cost of Engineer's services made necessary to review such additional resubmittals. Owner will in turn reimburse Engineer.

C. Requests for Information:

1. Engineer reserves the right to reject, any Request for Information (RFI) that the Engineer, at its sole discretion, deems frivolous.
2. Engineer reserves the right to reject, any RFI that the Engineer, at its sole discretion, deems already answered in the Contract Documents.
3. RFI process shall not be used for requesting substitutions. Procedures for substitutions are clearly specified elsewhere in the contract documents.

D. Submit Product data for concrete component materials and other concrete related items including, but not limited to:

1. Material Certificates: Signed by Manufacturer that each of the following items complies with requirements:
 - a. Cementitious materials and aggregates.
 - b. Admixtures.
 - c. Form materials and form-release agents.
 - d. Steel reinforcement and accessories.
 - e. Epoxy coating.
 - f. Fiber reinforcement.
 - g. Waterstops.
 - h. Curing materials.
 - i. Floor and slab treatments.
 - j. Bonding agents.
 - k. Vapor barriers/reducer.
 - l. Repair materials.
2. Submit certification that curing compound or evaporation reducer, if used, is compatible with sealers, traffic coatings, sealants, and expansion joint assemblies specified in Division 07 Sections, and pavement markings specified in Division 09 Section "Pavement Markings".

E. Submit materials certificates in lieu of materials laboratory test reports when permitted by Engineer. Materials certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

F. Submit evidence of licensure in Michigan for professional engineer providing professional services as required for Contractor in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures.

1. Contractor's responsibilities include formwork, shoring, and re-shoring procedures, and other work described in Article "Contractors Professional Services- Performance and Design Criteria", Article "Formwork", and Article "Shores and Re-shores".
2. Performance and design criteria are shown on the Drawings and in Article "Contractor's Professional Services- Performance and Design Criteria".

3. Contractor's Professional Engineer shall furnish Owner a Certificate of Professional Liability Insurance in minimum amount of \$1,000,000 per claim.
 4. Submit calculations and dimensions for "Nominal Form Width" for linear gap at time of forming or erecting concrete elements bounding the expansion joints in accordance with Drawings and Specification "Expansion Joint Assemblies".
 5. Submit signed and sealed drawings, calculations, specifications, or other submittals to indicate compliance with the applicable performance and design criteria provided.
- G. Submit concrete mixture proportions to Engineer for each concrete mixture. Submit alternate mixture proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
1. Provide mixture proportions not less than four weeks before placing concrete and not less than one week before pre-installation conference (pre-concrete meeting).
 2. Proportion mixtures as defined in ACI 301 Section 4 header "Proportioning". Mixtures shall be proportioned by party other than Testing Agency responsible for testing Project concrete.
 3. Proportion mixtures to minimize effects of thermal and drying shrinkage. See Part 2 heading "Concrete Mixtures" header "Shrinkage" for drying shrinkage limit.
 4. Use mixture proportions submission form at end of this Section for each concrete mixture, which identifies the following:
 - a. Mixture Proportions Identification and use.
 - b. Method used for documentation of required average compressive strength, (ACI 301 Section 4 – *Field test data* or *Trial mixtures*).
 - c. Gradation of fine and coarse aggregates.
 - d. Proportions of all ingredients including all admixtures added either at time of batching or at job site.
 - e. Water/cementitious materials ratio.
 - f. Slump, ASTM C143.
 - g. Certification of the chloride content of admixtures.
 - h. Air Content:
 - 1) Of freshly mixed concrete by pressure method, ASTM C231, or volumetric method, ASTM C173.
 - 2) Of hardened concrete by microscopical determination, including parameters of air-void system, ASTM C457.
 - i. Freeze-thaw resistance, ASTM C457 and C666. If super-plasticized concrete cannot meet hardened air content requirements of Part 2, ASTM C666 laboratory test result of specimens with concrete mixture proportions similar to proposed mixture for project shall be submitted for review by Engineer. Report air void parameters (spacing and specific surface area in accordance with ASTM C457) (at point of placement) of specimens tested. Test specimens shall contain specified air system (within plus or minus 1.5 percent) and high-range water-reducer (superplasticizer) used in concrete for project. Report relative durability factor of concrete for specimens tested in accordance with Procedure A of ASTM C666. Acceptable concrete durability factor greater than 90 percent (> 90%) at 300 test cycles. Relative

- durability factor of concrete containing superplasticizer greater than or equal to 80 percent ($\geq 80\%$) compared with reference.
- j. Density (Unit weight) of concrete, ASTM C138.
 - k. Strength at 4, 7, and 28 days, ASTM C39. In addition, for post-tensioned concrete provide a strength gain curve with sufficient number of data points from 6 to 96 hours to accurately estimate when the minimum compressive strength for tensioning the concrete will be achieved. See Section "Unbonded Post-Tensioning Repairs".
 - l. Water soluble chloride ion content of concrete: ASTM C 1218.
 - m. Rapid Chloride Permeability test results per ASTM C 1202.
 - n. Mill test report of silica fume: Provide report for each 400 cu. yd. or fraction thereof, of concrete placed on project. Provide to Owner from independent testing lab showing chemical analysis in percent by weight of silica fume solids supplied and used.
 - o. Silica fume concrete admixture: Comply with ASTM C1240 and following additional requirements:
 - 1) Silicon dioxide content: 90 percent (minimum).
 - 2) Loss on ignition (LOI): 6 percent (maximum).
 - 3) Surface area (nitrogen absorption): 15,000 m²/kg.
 - 4) Crystallinity: Non-crystalline within limits of detection less than or equal to 0.5 percent [$\leq 0.5\%$] depending upon x-ray machine used] by x-ray diffraction.
 - 5) Oversize foreign materials (in fume): 5% maximum on 45 micron sieve (wet).
 - p. Shrinkage (length change), ASTM C157 (modified) for cast-in-place post-tensioned concrete only. See Part 2 heading "Concrete Mixtures" header "Shrinkage" for modifications to ASTM C157.
 - q. Certificate of analysis of coal fly ash or processed ultra-fine fly ash: Comply with ASTM C618, Class F.
- H. Testing Agency: Promptly report all field concrete test results to Engineer, Contractor, and Concrete Supplier. Include following information:
- 1. See Article "Quality Assurance".
 - 2. Density (unit weight) of concrete: ASTM C 138.
 - 3. Slump: ASTM C 143.
 - 4. Air content of freshly mixed concrete by pressure method, ASTM C 231 or volumetric method, ASTM C 173.
 - 5. Concrete temperature at placement time: ASTM C 1064.
 - 6. Air temperature at placement time.
 - 7. Strength determined in accordance with ASTM C 39.
 - 8. Rapid Chloride Permeability Test of core samples in accordance with ASTM C 1202, as and when directed by Owner/Engineer.
 - 9. Shrinkage (length change) of superstructure concrete, ASTM C 157 (modified) for post-tensioned concrete and other concrete as noted on the drawings. Shrinkage shall be equal to or less than 0.04% at 28 days
 - 10. Calcium Nitrite presence in plastic concrete: See Part 3 heading, "Quality Control."

- I. Contractor: Submit grout temperature limitations with grout submittal.
- J. Submit current certification of welders.
- K. Submit shop drawings for steel reinforcement:
 - 1. Prepare placing drawings that detail fabrication, bending, and placement of concrete reinforcement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement. Comply with ACI SP-66, "ACI Detailing Manual". Include special reinforcement required for openings through concrete structures, elevations of all walls and columns with locations of all splices and couplers.
 - 2. Prepare steel reinforcement placing drawings in coordination with the Work of Section "Unbonded Post-Tensioning Repairs". Review the Unbonded Post-Tensioning Repairs tendon shop drawings to determine placement details and clearances. Notify Engineer of potential interference or conflicts for placing reinforcement and post-tensioning tendons.
- L. Submit samples of materials as requested by Engineer, including names, sources, and descriptions as follows:
 - 1. Normal weight aggregates.
 - 2. Fibrous reinforcement.
 - 3. Reglets.
 - 4. Waterstops.
 - 5. Vapor retarder.
- M. Submit laboratory test reports for concrete materials and mixtures.
- N. Submit Minutes of concrete pre-installation conference.

1.5 CONTRACTOR'S PROFESSIONAL SERVICES - PERFORMANCE AND DESIGN CRITERIA

- A. Provide professional services for temporary conditions during construction and portions of the Work required to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. Specific requirements and criteria include, but are not limited to:
 - 1. Design, erect, shore, brace, and maintain formwork, according to ACI 301 and ACI 347 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads. The contractor is responsible for layout and design, reviews, approvals, and inspections.
 - 2. Design formwork, shoring, bracing, and other conditions for structural requirements and stability during construction and until final structure is completed and accepted.

- a. Comply with ACI 347.2 for design, installation, and removal of shoring and reshoring.
 - b. Superimposed loads to the concrete structure, slab-on-grade, and soil shall be less than the design loads as shown on Drawings.
 - c. Check early-age strength of concrete members against anticipated construction loads. Reduce the load on concrete members at the critical concrete age or change the concrete mixture for accelerated strength gain to avoid distress of concrete members.
 - d. In multi-story construction, extend shoring or reshoring over a sufficient number of stories to distribute loads such that no floor or member would be excessively loaded or would induce tensile stresses in concrete members.
 - e. Plan sequence of removal of shores and reshores to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excess stress or deflection.
 - f. Consider the effects of post-tensioning sequence for post-tensioned beams and girders. Review post-tensioning design criteria on the drawings and in specification Section "Unbonded Post-Tensioning Repairs".
- B. Design the "Nominal Form Width" for linear gap at time of forming or erecting concrete elements bounding the expansion joints in accordance with Drawings and Specification Section "Expansion Joint Assemblies".

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer Qualification: An experienced supplier who is experienced in manufacturing ready-mixed concrete products complying with ASTM C94 requirement for production facilities and equipment. Manufacturer shall also be certified according to the National Ready Mixed Concrete Association's Certifications of Ready Mixed Concrete Production Facilities.
- C. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
1. ACI 301, "Specifications for Structural Concrete".
 2. ACI 318, "Building Code Requirements for Structural Concrete and Commentary".
 3. ACI 117, "Standard Specifications for Tolerances for Concrete Construction and Materials".
 4. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice".
- D. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in Michigan and who is experienced in providing professional engineering services of the kind indicated. See Article "Contractor's Professional Services Performance and Design Criteria".

- E. Materials and installed work may require retesting at any time during progress of work. Retesting of rejected materials for installed work shall be done at Contractor's expense.
- F. Prior to scheduled start of concrete construction, contractor shall conduct meeting to review proposed mixture proportions and methods and procedures to achieve required concrete quality. Contractor shall send pre-concrete conference agenda to all attendees in advance of scheduled date of conference indicating review requirements. Representatives of each entity directly concerned with cast-in-place concrete shall attend conference including, but not limited to:
 - 1. Contractor's superintendent.
 - 2. Agency (laboratory) responsible for concrete mixture proportions.
 - 3. Agency (laboratory) responsible for field quality control.
 - 4. Ready-mixed concrete producer.
 - 5. Concrete subcontractor.
 - 6. Primary admixture manufacturers.
 - 7. Engineer or Owner's representative.
 - 8. At the pre-concrete meeting, the contractor shall provide a summary of concrete procedures to protect fresh concrete from rain.
 - a. The minutes shall include a statement by the Concrete Contractor indicating that the proposed mixture proportions and the placing/finishing/curing techniques can produce the concrete quality required by these specifications.
- G. Welding of reinforcing steel is prohibited.
- H. Submit steel producer's certificates of mill analysis, tensile tests, and bend tests for reinforcing steel. Coordinate with welders and welding procedures.
- I. Epoxy coated reinforcement, ASTM A775 and A884:
 - 1. Coating applicator shall have quality control program to assure that coated reinforcement complies with requirements of Specifications.
 - 2. Submit proof of current certification for rebar coating plant from Concrete Reinforcing Steel Institute.
- J. Inspection of steel reinforcement is required in accordance with IBC Section 110. Inspections shall be conducted by an inspection agency employed by Owner and approved by Engineer. Inspector shall provide report in approved format to Owner with copy to Engineer and Contractor. Inspection agency has authority to reject reinforcing not meeting Contract Documents. Inspections for all reinforcing steel for conformance to shop drawings and Contract Documents shall be completed prior to concrete placement.
- K. Submit following information on Inspection of Reinforcement unless modified in writing by Engineer.
 - 1. Project name and location.
 - 2. Contractor's name.

3. Inspection Agency's name, address, and phone numbers (office and mobile).
 4. Date and time of inspection.
 5. Inspection Agency technician's name.
 6. Fabricator's name.
 7. Weather data:
 - a. Air Temperatures.
 - b. Weather.
 - c. Wind speed.
 8. Inspection location within structure.
 9. Reinforcement inspection data (including but not limited to):
 - a. Bar size, spacing, cover, and grade.
 - b. Splices, bends, anchorages.
 - c. Epoxy coating.
 - d. Support methods and construction sequencing.
 10. Diary of general progress of Work.
- L. Testing Agency Qualifications:
1. Independent agency, acceptable to authorities having jurisdiction, and acceptable to engineer, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 2. Testing laboratory shall submit documented proof of ability to perform required tests.
 3. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1 according to ACI CP-1 or an equivalent certification program.
- M. Testing Agency is responsible for conducting, monitoring, and reporting results of all tests required under this Section. Testing Agency shall immediately report test results showing properties that do not conform to Project Specification requirements to General Contractor's authorized on-site representative and to Owner's authorized on-site representative.
- N. Proportioning, production and finishing of silica fume and processed ultra-fine fly ash concrete shall be reviewed by and have approval of silica fume and processed ultra-fine fly ash manufacturers.
- O. Submit following Field Test information for Project Concrete unless modified in writing by Engineer:
1. Project name and location.
 2. Contractor's name.
 3. Testing Agency's name, address, and phone number.
 4. Concrete supplier.
 5. Date of report.
 6. Testing Agency technician's name (sampling and testing).
 7. Placement location within structure.

8. Time of batching.
9. Time of testing.
10. Elapsed time from batching at plant to discharge from truck at site.
11. Concrete mixture data (quantity and type):
 - a. Cement.
 - b. Fine aggregates.
 - c. Coarse aggregates.
 - d. Water.
 - e. Air entraining admixtures.
 - f. Water-reducing admixture and high-range water-reducing admixture.
 - g. Other admixtures.
 - h. Supplementary cementitious materials.
 - i. Micro-fibers or Macro-fibers
12. Weather data:
 - a. Air temperatures.
 - b. Weather.
 - c. Wind speed.
13. Field test data:
 - a. Date, time, and place of test.
 - b. Slump.
 - c. Concrete Temperature.
 - d. Air content.
 - e. Density (Unit weight).
14. Compressive test data:
 - a. Cylinder number.
 - b. Age of concrete when tested.
 - c. Date and time of cylinder test.
 - d. Curing time (field and lab).
 - e. Cross-sectional area of cylinder.
 - f. Compressive strength.
 - g. Type of failure (at break).
- P. All concrete flatwork finishers on Project shall hold current ACI Concrete Flatwork Finisher certification. Submit certification for each concrete flatwork finisher at Concrete Pre-Construction Conference and obtain Engineer's written acceptance.
- Q. Silica fume supplier shall make available qualified individual, experienced in placement of silica fume concrete, to aid Contractor. Qualification of supplier's representative shall be acceptable to Owner Representative, shall attend pre-construction meeting, and shall be present for all trial placements, initial startup and then as required by Owner.
- R. Coal fly ash and processed ultra-fine fly ash supplier shall make available qualified individual, experienced in placement of fly ash concrete, to aid Contractor. Qualification

of supplier's representative shall be acceptable to Owner. Representative shall attend pre-construction meeting, and shall be present for all trial placements, initial startup and then as required by Owner.

- S. At all times during high-evaporation conditions, maintain adequate supply of evaporation reducer at site. Do not use evaporation reducer as finishing aid. See Part 3.
- T. Testing Agency: Identify those trucks of concrete supplier's which meet requirements of NRMCA Quality Control Manual. Permit only those trucks to deliver concrete to Project.

1.7 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO, "Standard Specifications for Highway Bridges."
 - 2. AASHTO T 318, "Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying."
- B. American Concrete Institute (ACI):
 - 1. ACI 117, "Standard Specifications for Tolerances for Concrete Construction and Materials."
 - 2. ACI 214R, "Evaluation of Strength Test Results of Concrete."
 - 3. ACI 301, "Specifications for Structural Concrete."
 - 4. ACI 302.1R, "Guide for Concrete Floor and Slab Construction."
 - 5. ACI 305R, "Hot Weather Concreting."
 - 6. ACI 306.1, "Cold Weather Concreting."
 - 7. ACI 308R, "Guide to Curing Concrete."
 - 8. ACI 308.1, "Standard Specifications for Curing Concrete."
 - 9. ACI 318, "Building Code Requirements for Structural Concrete & Commentary."
 - 10. ACI 347, "Guide to Formwork for Concrete."
 - 11. ACI 347.2 "Guide to Shoring/Reshoring of Concrete Multistory Buildings."
 - 12. ACI 362.1, "Guide for the Design of Durable Parking Structures."
 - 13. ACI SP15, "Field Reference Manual."
- C. American Iron and Steel Institute (AISI):
 - 1. AISI, "Specification for the Design of Cold-Formed Steel Structural Members."
- D. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 36, "Standard Specification for Carbon Structural Steel."
 - 2. ASTM A 185, "Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete Reinforcement."
 - 3. ASTM A 497, "Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete Reinforcement."
 - 4. ASTM A 615, "Standard Specification for Deformed and Plain Carbon -Steel Bars for Concrete Reinforcement."

5. ASTM A 706, "Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement."
6. ASTM A 775, "Standard Specification for Epoxy-Coated Steel Reinforcing Bars."
7. ASTM A 884, "Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement for Reinforcement."
8. ASTM A 934/A 934M, "Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars."
9. ASTM B 633, "Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel."
10. ASTM C 31, "Standard Practice for Making and Curing Concrete Test Specimens in the Field."
11. ASTM C 33, "Standard Specification for Concrete Aggregates."
12. ASTM C 39, "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens."
13. ASTM C 94, "Standard Specification for Ready-Mixed Concrete."
14. ASTM C 109, "Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)."
15. ASTM C 138, "Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete."
16. ASTM C 143, "Standard Test Method for Slump of Hydraulic Cement Concrete."
17. ASTM C 150, "Standard Specification for Portland Cement."
18. ASTM C 157, "Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete."
19. ASTM C 171, "Standard Specification for Sheet Materials for Curing Concrete."
20. ASTM C 172, "Standard Practice for Sampling Freshly Mixed Concrete."
21. ASTM C 173, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method."
22. ASTM C 231, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method."
23. ASTM C 260, "Standard Specification for Air-Entraining Admixtures for Concrete."
24. ASTM C 309, "Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete."
25. ASTM C 311, "Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete."
26. ASTM C 330, "Standard Specification for Lightweight Aggregates for Structural Concrete."
27. ASTM C 457, "Standard Test Method for Microscopical Determination of Air-Void Content and Parameters of the Air-Void System in Hardened Concrete."
28. ASTM C 494, "Standard Specifications for Chemical Admixtures for Concrete."
29. ASTM C 567, "Standard Test Method for Determining the Density of Structural Lightweight Concrete."
30. ASTM C 595, "Standard Specification for Blended Hydraulic Cements."
31. ASTM C 618, "Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete."
32. ASTM C 666, "Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing."
33. ASTM C 672, "Standard Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals."
34. ASTM C 989, "Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars."

35. ASTM C 1064/C 1064M "Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete."
 36. ASTM C 1077, "Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation."
 37. ASTM C 1116, "Standard Specification for Fiber-Reinforced Concrete and Shotcrete."
 38. ASTM C 1202, "Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration."
 39. ASTM C 1218, "Standard Test Method for Water Soluble Chloride Ion in Mortar and Concrete."
 40. ASTM C 1240, "Standard Specification for Silica Fume Used in Cementitious Mixtures."
 41. ASTM C 1260, "Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar Bar Method)."
 42. ASTM C 1293, "Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction."
 43. ASTM C 1315, "Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete."
 44. ASTM C 1567, "Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerate Mortar Bar Method)."
 45. ASTM C 1602/C 1602M, "Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete."
 46. ASTM C 1610/C 1610M, "Standard Test Method for Static Segregation of Self-Consolidating Concrete Using Column Technique."
 47. ASTM C 1611/C 1611M, "Standard Test Method for Slump Flow of Self-Consolidating Concrete."
 48. ASTM C 1621/C 1621M, "Standard Test Method for Passing Ability of Self-Consolidating Concrete by J-Ring."
 49. ASTM D 448, "Standard Classification for Sizes of Aggregate for Road and Bridge Construction."
 50. ASTM D 3963/D 3963M, "Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars."
 51. ASTM E 96/E 96M, "Standard Test Methods for Water Vapor Transmission of Materials."
 52. ASTM E 1643, "Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs."
 53. ASTM E 1745 "Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs."
 54. ASTM F1637 02, "Standard Practice for Safe Walking Surfaces."
- E. American Welding Society (AWS):
1. AWS D1.1, "Structural Welding Code-Steel."
- F. Concrete Reinforcing Steel Institute (CRSI):
1. CRSI MSP, "Manual of Standard Practice."

G. US Army Corps of Engineers (CE):

1. CE CRD-C 513 "Specifications for Rubber Waterstops."
2. CE CRD-C 572 "Specifications for Polyvinyl Chloride Waterstops."
3. CE CRD-C 662 "Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials, Lithium Nitrate Admixture and Aggregate (Accelerated Mortar Bar Method.)"

H. Prestressed Concrete Institute (PCI):

1. PCI MNL 116, "Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products."
2. PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."
3. PCI MNL 120, "Design Handbook Precast Prestressed Concrete."
4. PCI MNL 122, "Architectural Precast Design Handbook."
5. PCI MNL 129, "Parking Structures-Recommended Practice for Design and Construction."
6. PCI MNL 135, "Tolerances for Precast and Prestressed Concrete Construction."
7. PCI "Code of Standard Practice for Precast Concrete."

I. Contractor shall have following ACI publications at Project construction site:

1. ACI SP-15, "Field Reference Manual: Standard Specifications for Structural Concrete ACI 301 with selected ACI References."
2. ACI 302.1R, "Guide for Concrete Floor and Slab Construction."
3. ACI 305R, "Hot Weather Concreting."
4. ACI 306.1, "Cold Weather Concreting."

J. Accessibility Requirements:

1. "Americans with Disabilities - Act Accessibility Guidelines for Buildings and Facilities", as published by U.S. Architectural & Transportation Barriers Compliance Board, 1331 F Street, N.W., Suite 1000, Washington, DC 20004-1111, 1-800-872-2253, <http://www.access-board.gov/adaag/ADAAG.pdf>

K. International Code Council (ICC):

1. IBC, "International Building Code 2012."
2. IPMC, "International Property Maintenance Code."
3. IFC, "International Fire Code."

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store all formwork and formwork materials clear of ground, protected, to preclude damage.

- B. Deliver reinforcement to Project site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.
- C. Store concrete reinforcement materials at site to prevent damage and accumulation of dirt or excessive rust.
- D. Avoid damaging coatings on epoxy coated reinforcement:
 - 1. Contact areas of handling and hoisting systems shall be padded or be made of nylon or other acceptable material.
 - 2. Use spreader bars to lift bundles of coated bars to prevent bar-to-bar abrasion.
 - 3. Pad bundling bands or fabricate of nylon or other acceptable material.
 - 4. Store coated bars on padded or wooden cribbing.
 - 5. Do not drag coated bars.
 - 6. After placement, restrict traffic on coated bars to prevent damage.
 - 7. Repair damaged epoxy coatings according to ASTM D 3963.
- E. Concrete transported by truck mixer or agitator shall be completely discharged within one and one half-hours (one hour for hot weather concreting) after water has been added to cement or cement has been added to aggregates. **For concrete with silica fume or processed ultra-fine fly ash concrete shall be completely discharged within one hour after water has been added to cement or cement has been added to aggregates, in all weather conditions, hot or cold.** Schedule deliveries to allow for delays due to weather, traffic, etc.

1.9 WARRANTY

- A. Period of this warranty shall be in accordance with the General Conditions or a minimum of one year after substantial completion of the work. Should any defect other than hairline cracks: defined as not more than 0.006 in. wide be discovered after acceptance and occupancy of Project, which can be directly attributed to defect in material or workmanship not evident at time of initial occupancy, then contractor shall, upon written notice, correct defects without expense to Owner or Engineer/Architect. The Contractor's warranty excludes remedy for damage or defect caused from abuse, improper or insufficient maintenance, or normal wear and tear.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints. Provide for all locations exposed to public view.

1. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Form Coatings: Provide commercial formulation form-coating compounds with a maximum VOC of 350 grams/liter that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces including, but not limited to: water-curing, curing compound, stains, or paints.
- D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1.5 in. to exposed surface.
 1. Provide ties that, when removed, will leave holes not larger than 1 in. diameter in concrete surface.
- E. Chamfer strips: Wood, metal, PVC, or rubber strips. 0.75 in. by 0.75 in. min. unless noted otherwise.
- F. Nails for P-T Anchors: Stainless steel ring shank nails.
 1. Clendenin Brothers, Baltimore, MD.
 2. Or Equal.

2.2 STEEL REINFORCEMENT

- A. Reinforcement Bars: ASTM A 615, deformed, yield strength: as noted on Drawings.
- B. Epoxy-Coated Fabricated Reinforcing Bars: ASTM A775, and as follows:
 1. Steel Reinforcement: ASTM A 615, Grade 60, deformed bars.
- C. Post-tensioned Reinforcement: See Section "Unbonded Post-Tensioning Repairs".
- D. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
 1. Welded wire reinforcement: Provide in mats only. Roll stock prohibited.
- E. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.3 REINFORCEMENT ACCESSORIES

- A. Bar supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from all plastic of greater compressive strength than concrete, and as follows:
1. In manner acceptable to Engineer solely, bar and welded wire reinforcement supports shall be color-coded to visually differentiate supports by height and shall be fabricated to resist overturning during construction operations.
 2. For slabs on ground, use all-plastic supports with sand plates or horizontal runners where base materials will not support chair legs. All supports shall have sufficient surface area in contact with ground so that they shall not allow clearance loss when reinforcement installed or concrete placed.
 3. For concrete surfaces exposed to view where bar supports contact forms, supports shall have minimal contact, shall not cause voids and shall not cause damage to surrounding concrete. Use all-plastic supports conforming to CRSI Class 1 protection requirements.
 4. Chairs shall be sized and spaced to prevent cover loss during construction operations.
 5. For epoxy-coated reinforcement, use all-plastic bar supports.
 6. Acceptable manufacturers:
 - a. Dayton Superior Corp.
 - b. General Technologies, Inc.
 - c. Accepted equivalent.
 7. For welded wire reinforcement, provide continuous bar supports spaced at 2 feet o.c., maximum."
- B. Epoxy Coating Materials for Reinforcement: ASTM A 775 and A 884:
1. Supplier shall be certified currently under CRSI Fusion Bonded Epoxy Coating Applicator Plant Certification Program.
 2. Provide one of following epoxy coatings for reinforcement and steel accessories as noted on Drawings:
 - a. "Scotchkote 413," 3M Company.
 - b. "Nap-Gard 7-2709," DuPont Powder Coatings, USA, Inc.
 - c. "Epoxiplate R346 or R349," Armstrong Products Company.
 3. Use patching material recommended by epoxy powder manufacturer, compatible with epoxy coating and inert in concrete. Acceptable:
 - a. "Scotchkote 413 PC," 3M Company.
 - b. "Armotec 110," Sika Corporation.
 - c. "MasterEmaco P 124", BASF Construction Chemicals, LLC.
 - d. "Duralprep AC," The Euclid Chemical Company.
 - e. "Rebar Spray J62", Dayton Superior Corp.

- C. Epoxy Coating for Existing Exposed Non-prestressed Steel Reinforcement or Welded Wire Reinforcement:
 - 1. Provide one of following epoxy coatings:
 - a. "Sikadur 32 Hi-Mod," Sika Chemical Corp.
 - b. "MasterEmaco ADH 326," BASF Construction Chemicals, LLC.
 - c. "Scotchkote 413 PC," 3M Company.
 - d. "Dural 452 Series," The Euclid Chemical Company.
 - e. "Sure Bond J-58," Dayton Superior Corporation.
- D. For mechanical tension splices of reinforcement:
 - 1. All splices to develop 125 percent of specified yield strength of bars, or of smaller bar in transition splices. Acceptable products:
 - a. Bar-Lock Rebar Coupler, by Dayton Superior.
 - b. Bar-Grip or Grip-Twist, by Barsplice Products, Inc.
 - c. Extender HRC 500 Series Coupler, by Headed Reinforcement Corp.
 - d. Splice Sleeve, by NMB.
 - e. LENTON Splices, by Erico.
- E. Compression Splices: Mechanically-coupled splices in accordance with ACI 318, Chapter 12.

2.4 CONCRETE MATERIALS

- A. Ready-Mixed Concrete: Obtain concrete from plant with current certification from:
 - 1. Concrete Materials Engineering Council.
 - 2. Michigan Department of Transportation.
 - 3. National Ready Mixed Concrete Association.
 - 4. Prestressed Concrete Institute.
- B. Portland Cement (ACI 301, Section 4 header "Cementitious Materials"):
 - 1. Portland cement, Type I, ASTM C 150. Use one cement supplier throughout project. No change in brand or supplier without prior written acceptance from Engineer.
- C. Coal Fly Ash:
 - 1. ASTM C 618, Class F.
 - 2. Testing: ASTM C311.
 - 3. Percentage of fly ash in Mixture Proportion shall be by weight, not by volume. Water/cement ratio will be calculated as water/cementitious (total cement and fly ash) ratio.
 - 4. See Section "Unbonded Post-Tensioning Repairs" for strength requirements for concrete to be post-tensioned.

5. Prohibited: Fly ash in same mix with Type IP blended cement.
6. If strength or air content varies from value specified by more than specified tolerances, Contractor or designated representative shall reject that concrete.
7. Submit all fly ash concrete Mixture Proportions per ACI 301.

D. Slag – (Ground Granulated Blast-Furnace Slag – GG-BFS):

1. ASTM C 989, Grade 100 or higher.
2. Percentage of GGBF slag in Mixture Proportion shall be by weight, not by volume. Water-cement ratio shall be calculated as water-cementitious (total Portland cement + GGBF slag) ratio.
3. If strength or air content varies from value specified by more than specified tolerances, Contractor or designated representative shall reject that concrete.
4. Submit all GGBF slag concrete mixture proportions per ACI 301.

E. Normal Weight Aggregates (ACI 301, Section 4 header “Aggregates”):

1. Normal weight concrete aggregates:
 - a. Coarse aggregate: Crushed and graded limestone or approved equivalent conforming to ASTM C33 except as noted here, minimum class designations as listed below:
 - 1) Below grade construction and below frost line: Class 1S.
 - 2) Walls not exposed to public view: Class 3S.
 - 3) Walls exposed to public view: Class 5S.
 - 4) Slabs on ground: Class 4S.
 - 5) All other concrete: Class 5S.
 - b. No deleterious materials such as, but not limited to, chert or opaline.
 - c. Fine aggregate: Natural sand conforming to ASTM C 33 and having preferred grading shown for normal weight aggregate in ACI 302.1R, Table 8.5.1.
 - d. Coarse Aggregate shall not contain crushed hydraulic-cement concrete.
2. Combined Aggregate Gradation: Well graded from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve, except that less than 8 percent may be retained on coarsest sieve and on No. 50 sieve, and less than 8 percent may be retained on sieves finer than No. 50.
3. Coarse aggregate: Nominal maximum sizes indicated below, conforming to ASTM C 33, Table 2:
 - a. Footings/Foundations: Size number 57 or 357.
 - b. Toppings and washes less than 3 in. thick: Size number 7 or 67.
 - c. Slab on grade: Size number 57.
 - d. All other members: Size number 67.
4. Chloride Ion Level: ASTM C 1218. Chloride ion content of cement, aggregates and all other ingredients: Tested by laboratory making trial mixes.

- F. Water: Comply with ASTM C 1602.
- G. Storage of Materials (ACI 301, Section 4 header "Materials Storage and Handling").

2.5 ADMIXTURES

- A. Use high-range water-reducing admixture (superplasticizer) in concrete as required for placement and workability.
- B. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg. F as required for schedule.
- C. Use high-range water-reducing admixture (HRWR) in pumped concrete, and for concrete with water/cementitious ratio of less than or equal to 0.45.
- D. Self-consolidating concrete (SCC) may be used where placement due to either dense reinforcement or form design requires both a high level of workability (horizontal slump flow greater than 24 in. diameter) and the water/cementitious ratio is less than or equal to 0.45.
- E. Use air-entraining admixture as indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1.5 percent within limits shown on Drawings.
- F. Only admixture manufacturers listed acceptable. Do not submit alternate manufacturers.
- G. Concrete supplier and manufacturer shall verify via trial mixes and certify compatibility (no adverse effect on workability, strength, durability, entrained air content, etc.) of all ingredients in each Mixture. Use admixtures in strict accordance with manufacturer's recommendations.
- H. Prohibited Admixtures: Calcium chloride or admixtures containing intentionally added chlorides shall not be used.
- I. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
 - 1. Products: Subject to compliance with requirements, provide one of following:
 - a. "Air-Mix," "Eucon Air-Series" or "AEA-92," Euclid Chemical Co.
 - b. "Daravair Series" or "Darex Series," GCP Applied Technologies.
 - c. "Micro-Air," or "MB-VR," or "MBAE-90," BASF Construction Chemicals.
 - d. "Sika AEA Series," or "Sika AIR Series," Sika Corporation.
 - e. "ConAir Series," Premiere Concrete Admixtures.
 - f. Polychem "VR" or "VRC" or "Polychem AE," General Resource Technology.
 - g. "RSA-10," Russ Tech Admixtures, Inc.

J. High Range Water-Reducing Admixture (Superplasticizer): ASTM C 494, Type F.

1. Products: Subject to compliance with requirements, provide one of following:
 - a. "Eucon 37" or "Plastol Series," Euclid Chemical Co.
 - b. "Daracem Series" or "ADVA Series," GCP Applied Technologies.
 - c. "Rheobuild 1000", "PS 1466" or "Glenium Series," BASF Construction Chemicals.
 - d. "Sikament Series" or "Sika ViscoCrete Series," Sika Corporation.
 - e. "Melchem Series," General Resource Technology.
 - f. "Superflo 443" or "Superflo 2000 Series," Russ Tech Admixtures, Inc.
 - g. "EcoFlo Series" or "UltraFlo Series," Premiere Concrete Admixtures.

K. High-Range Water-Reducing Admixture (Superplasticizer) for Self-Consolidating Concrete, ASTM C 494 Type F.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Plastol Series" or "Eucon SPJ," Euclid Chemical Co.
 - b. "ADVA Series," GCP Applied Technologies.
 - c. "Glenium Series" or "PS1466," BASF Construction Chemicals.
 - d. "Sika ViscoCrete Series" or "Sikament Series", Sika Corporation.
 - e. "Superflo 2000 Series," Russ Tech Admixtures, Inc.
 - f. "UltraFlo Series," Premiere Concrete Admixtures.

L. Viscosity Modifying Admixture for Self-consolidating Concrete:

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Visctrol" or "Eucon ABS," Euclid Chemical Co.
 - b. "Rheomac VMA Series," BASF Construction Chemicals.
 - c. "Sika Stabilizer Series," Sika Corporation.
 - d. "AWA-C61," Russ Tech Admixtures, Inc.
 - e. "V-MAR," GCP Applied Technologies.
 - f. "UltraFinish A1" or "PCA-AWA," Premiere Concrete Admixtures.

M. High Range water reducing retarding (superplasticizer), ASTM C 494 Type G:

1. Products: Subject to compliance with requirements, provide one of following:
 - a. "Eucon 537 or RD2," Euclid Chemical Co.
 - b. "Daracem 100," GCP Applied Technologies.
 - c. "Sikament Series," Sika Corporation
 - d. "Melchem," General Resource Technology.

N. Corrosion Inhibiting Admixture capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Calcium Nitrite based Corrosion Inhibitor shall have a concentration of 30 percent, plus or minus 2 percent of solids content. Dosage rate shall be 3 gal/cu. yd. of concrete which will inhibit corrosion to 9.9 lbs. of chloride per cu. yd. of concrete.
 - 1) "Eucon CIA" or "Eucon BCN," Euclid Chemical Company.
 - 2) "DCI" or "DCI-S," GCP Applied Technologies.
 - 3) "Rheocrete CNI," BASF Construction Chemicals.
 - 4) "Sika CNI," Sika Corporation.
 - 5) "Polychem CI," General Resource Technology.
 - 6) "Russ Tech RCI," Russ Tech Admixtures, Inc.
 - 7) "Impede CNI," Premiere Concrete Admixtures.
- b. Amine Carboxylate based corrosion inhibitor (concentrated liquid or powder formulation).
 - 1) "MCI-2005," Cortec Corporation, dosage rate 1.0 pt./cu. yd.
 - 2) "MCI-2005 NS," Cortec Corporation, dosage rate 1.5 pt./cu. yd.
 - 3) "MCI-2006 NS," Cortec Corporation, dosage rate 1 lb/cu. yd.

O. Silica Fume ASTM C 1240:

1. Products: Subject to compliance with requirements, provide one of following:
 - a. "Eucon MSA," Euclid Chemical Co.
 - b. "Force 10,000 D", GCP Applied Technologies.
 - c. "Rheomac SF 100," BASF Construction Chemicals.
 - d. "Sikacrete 950 DP," Sika Corporation.
 - e. "Polychem CI," General Resource Technology.
 - f. "EMS 970DA (Elkem Materials) Dry Compacted Silica Fume," General Resource Technology.
 - g. "Russ Tech CSF," Russ Tech Admixtures, Inc.
 - h. "PCA-DSF," Premiere Concrete Admixtures.

P. Shrinkage Reducing Admixture:

1. Design requires using materials with combined drying shrinkage characteristic of 0.04 percent maximum at 28 days. Proposed concrete Mixture(s), using actual aggregates, admixtures and cement of the proposed mix for Project as detailed herein and in Drawings, shall meet criteria. Submit ASTM C 157 (may be modified by curing period duration) results for at least 3 specimens. Test takes 28 days minimum. Begin tests as soon as possible so final test results available for submittal to Engineer.
2. Products: Subject to compliance with requirements, provide one of following:
 - a. If calcium nitrite is present in the original concrete mixture:
 - 1) "Eclipse 4500," GCP Applied Technologies.
 - 2) "Eucon SRA +" or "Conex," Euclid Chemical Company.
 - 3) "Sika Control 40", Sika Corporation.

b. If calcium nitrite is not present in the original concrete mixture:

- 1) "Eucon SRA," "Eucon SRA+," or "Conex" Euclid Chemical Company.
- 2) "Eclipse 4500," GCP Applied Technologies.
- 3) "Tetraguard AS 20," BASF Construction Chemicals.
- 4) "Sika Control 40," Sika Corporation.
- 5) "SRA-157," Russ Tech Admixtures, Inc.
- 6) "PCA-SRA," Premiere Concrete Admixtures.

Q. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.6 CURING MATERIALS

A. Evaporation Reducer: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Evaporation Retarder:

- a. Eucobar; Euclid Chemical Co.
- b. E-Con; L&M Construction Chemicals, Inc.
- c. MasterKure ER 50; BASF Construction Chemicals.
- d. SikaFilm; Sika Corporation.
- e. AquaFilm Concentrate J74; Dayton Superior Corporation.
- f. "EVRT," Russ Tech Admixtures, Inc.
- g. "Barrier," Premiere Concrete Solutions.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Curing Compound: Prohibited for concrete with water/cementitious materials ratio less than 0.45.

2.7 RELATED MATERIALS

A. Bonding Additive: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene. Confirm compatibility with galvanic anode manufacturer, if utilized.

B. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements. Confirm compatibility with galvanic anode manufacturer, if utilized.

- C. Post Installed mechanical and adhesive anchors shall be manufactured by Hilti Fastening Systems, Tulsa Oklahoma, ITW Ramset/Red Head, Wood Dale, IL, Simpson Anchor Systems, Columbus, OH, Powers Fasteners, Brewster, NY, or accepted equivalent. Anchor bolt composition shall be from one or more of carbon steel and stainless steel, lead, Zamac alloy, nylon, plastic, polypropylene, and jute fiber.
1. Strength of anchors shall comply with ACI 318-11 Appendix D, and ACI 355.2 and ICC-ES-AC193 for mechanical anchors and ACI 355.4 and ICC-ES-AC308 for adhesive anchors.
 2. Carbon steel anchors shall be either zinc plated in accordance with ASTM B 633, or hot-dipped galvanized in accordance with ASTM A-153-78. Provide mill test reports and manufacturer's quality control certification upon Engineer's request.
 3. Stainless steel anchors shall be manufactured from ASTM A304, or A663 stainless steel. Provide mill test reports and manufacturer's quality control certification upon Engineer's request.
 4. Plastic, lead, or Zamac alloy anchors shall not be used for overhead applications. Adhesive anchors shall not be used to resist pullout forces in overhead and wall installations. For adhesive anchors, consult with manufacturer's engineer.
 5. Safety Factors: Static loads 4:1 minimum. Static load safety factors shall be per manufacturer's published data. Critical load (vibratory, overhead, etc. or more) safety factors shall be 10:1 minimum. Adhesive anchors are not permitted for critical loads and where resistance to direct sustained tension is required.
 - a. If necessary for purposes of determining tensile and/or shear capacity in questionable base material, testing shall be done prior to actual anchor installation. A maximum of five tension and/or shear tests shall be performed by manufacturer's engineer. Anchors shall be proof loaded in tension and/or shear to assure that working load capacity is within specified allowable load limit as published by manufacturer.
 6. Anchor spacing and edge distance per manufacturer's limits. Loading and cluster spacing shall be as established by minimum industry standards for anchors, except as follows: Anchor loading, cluster spacing and edge distances shall be as published in manufacturer's literature. Consult with manufacturer's engineer for specific requirements.
 7. Anchor installation shall be as required by manufacturers printed installation instructions.
- D. Joint Filler:
1. Joint filler in slabs and curbs: Asphalt-impregnated fiber board; as shown on Drawings. Acceptable products:
 - a. "Flexcell," Knight-Celotex Corp.
 - b. "Fibre Expansion Joint," W.R. Meadows, Inc.
 2. Joint filler used vertically to isolate walls from columns or other walls: White molded polystyrene beadboard type.
 3. Joint cover used to bridge gap between columns and grade walls, retaining walls, or basement walls: Minimum width: Gap width plus 4 in. For gaps over 3 in. wide,

protect cover with protection board sized to span gap satisfactorily. Acceptable products:

- a. "Sealtight Premoulded Membrane Vapor Seal," W.R. Meadows, Inc., Elgin, Illinois.
- b. "Sealtight Melgard," W.R. Meadows, Inc., Elgin, Illinois and shall be applied according to manufacturer's instructions.

2.8 CONCRETE MIXTURES

- A. Proportion mixtures determined by either laboratory trial mix or field test data bases, as follows:
 1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.
 2. Provide different mixtures as the season warrants, as well as each type and strength of concrete or for different placing methods.
- B. Use a qualified independent testing agency for preparing and reporting proposed Mixture Proportions for the laboratory trial mix basis.
- C. Requirements for normal-weight concrete mix are shown on Drawings:
 1. Compressive strength.
 2. Slump.
 3. Water-cementitious materials ratio.
 4. Air content.
- D. Supplementary Cementitious Materials: Limit percentage, by weight, of cementitious materials according to ACI 318 requirements.
- E. Supplementary Cementitious Materials: Maximum weight of fly ash, natural pozzolans, silica fume, processed ultra-fine fly ash or slag included in concrete shall not exceed percentages of total weight (see footnotes for ACI 301 Part 4 Table "Requirements for Concrete Exposed to Deicing Chemicals") of cementitious materials as follows:
 1. Fly Ash or other pozzolans conforming to ASTM C 618: 25 percent.
 2. Slag conforming to ASTM C 989: 25 percent.
 3. Silica fume conforming to ASTM C 1240: 10 percent.
 4. Processed ultra-fine fly ash conforming to ASTM C 618: 15 percent.
Total of fly ash or other pozzolans, slag, and silica fume: 50 percent. Within the total, Fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 5. Total of fly ash or other pozzolans and silica fume: 35 percent. Within the total, Fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 6. Total of fly ash or other pozzolans and processed ultra-fine fly ash: 35 percent. Within the total, Fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

F. Air Entrainment:

1. See General Notes on Drawings for total average air content (percent by volume).
2. Average air content shall exceed value stated in General Notes on Drawings.
3. Permissible variation for any one test result from specified average total air content: plus or minus 1.5 percent.
4. Hardened concrete shall have an air void spacing factor of 0.0080 in. maximum. Specific surface (surface area of air voids) shall be 600 in² per cu in. of air-void volume, or greater. Concrete mixes not meeting these values as determined by ASTM C 457 may require adjustments unless accepted in writing by Engineer. Refer to Part 1 Article "Submittals".

G. Chloride Ion Content of Mixture:

1. Water soluble chloride ion content of concrete shall not exceed 0.06 percent by weight of cement for pre-stressed or post-tensioned concrete, and 0.15 percent for reinforced concrete (ACI 318 Chapter 4 Table 4.4.1 "Maximum Chloride Ion Content for Corrosion Protection of Reinforcement"). Test to determine chloride ion content shall conform to ASTM C 1218.
2. Concrete chloride ion content shall be determined by Testing Agency prior to placement. Cast samples from current production of concrete mix proposed for superstructure.
3. Concrete not meeting the requirements of paragraph "Water soluble chloride ion content of concrete..." above, shall contain appropriate amount of calcium nitrite. Concrete supplier shall provide laboratory test results showing the amount of excess chloride ion content in the concrete mixture contributed by the aggregates. For each pound of chloride ion in excess of the amount allowed, mix shall contain calcium nitrite (30 percent, plus or minus 2 percent, solids content) on one-to-one basis (one gallon of calcium nitrite for one lb. of excess chloride ion). Calcium nitrite used to offset chloride ions is in addition to calcium nitrite used as a corrosion inhibitor. Maximum of 1.5 lb. of chloride ion per cubic yard may be offset in this manner.

H. Resistance to Alkali-Silica Reaction: Unless otherwise specified, or unless members are assigned to Exposure class C0, use one of the three options below for qualifying concrete mixtures to reduce the potential of alkali-silica reaction:

1. For each aggregate used in concrete, the expansion result determined in accordance with ASTM C1293 shall not exceed 0.04 percent at 1 year.
2. For each aggregate used in concrete, the expansion result of the aggregate and cementitious materials combination determined in accordance with ASTM C1567 shall not exceed 0.10 percent at an age of 16 days.
3. Alkali content in concrete (LBA) shall not exceed 4 lb/yd³ for moderately reactive aggregate or 3 lb/yd³ for highly reactive aggregate. Reactivity shall be determined by testing in accordance with ASTM C1293 and categorized in accordance with the ASTM C1778. Alkali content shall be calculated as follows:
 - a. $LBA = (\text{cement content lb/yd}^3) \times (\text{equivalent alkali content of portland cement in percent} / 100 \text{ percent}).$

- I. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Consider using high-range water-reducing admixture (Superplasticizers), OR admixtures that achieve self-consolidating concrete, as required, for placement, workability, finishing and when required, increased flowability.
 - 2. Consider using retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use high range water-reducing admixture in pumped concrete and concrete with a water-cementitious materials ratio of 0.45 or less.
 - 4. Use corrosion-inhibiting admixture in concrete mixes as indicated.
- J. Slump (ACI 301, Part 4 header "Slump"):
 - 1. Maximum slump for concrete is indicated on Drawings. Where field conditions require slump to exceed that shown, increased slump shall be obtained by use of high range water reducers (superplasticizers) only, and Contractor shall obtain written acceptance from Engineer who may require an adjustment to mix.
 - 2. All concrete containing high-range water-reducing admixture (superplasticizer) shall have a verified initial slump of 2–3 in. Final slump after the addition of the superplasticizer shall be 6–9 in. as required by the contractor to properly place the concrete. Before permission for plant addition of superplasticizer to be granted by Engineer, fulfill following requirements:
 - a. Submit letter from testing laboratory which developed original mixture proportions, for each superplasticized mixture, certifying volume of mix water which will produce specified slump and water/cement ratio, taking into account aggregate moisture content.
 - b. Submit plant computer printout of mixture ingredients for each truckload of superplasticized concrete with delivery of that truckload. Mix water volume greater than that certified shall be cause for concrete rejection.
 - c. Over-retarding or crusting of flatwork surface: Cause for concrete rejection.
 - d. Segregation or rapid slump loss (superplasticizer life) due to incompatibility or under-dosing: Cause for concrete rejection.
- K. Shrinkage (Length Change):
 - 1. Determine length change of hardened concrete test specimens in accordance with ASTM C 157, except as noted in paragraph below. Existing test data from previous project with same materials may be acceptable.
 - 2. Test specimens shall be moist cured, including period in molds for 7 days. Then store specimens in air for period of 28 days.
 - 3. Utilize concrete materials and mix proportions submitted in accordance with Part 1 Article "Submittals".
 - 4. Report length change of specimens after periods of air drying after curing of 4, 7, 14, 21, and 28 days.
 - 5. Average length change after 28 days shall be limited to 0.04%, unless otherwise accepted by Engineer. Values exceeding 0.04% shall be rejected.

L. Self-Consolidating Concrete:

1. Obtain Engineer approval of proposed repair locations utilizing self-consolidating concrete prior to use.
2. Minimum flow of 24 in. to 28 in. or as required by the successful test placement. All self-consolidating concrete shall contain the specified high-range water-reducing admixture and viscosity-modifying admixture as required.
3. Measure slump flow using slump cone upright or inverted in accordance with ASTM C1611. Measured flow shall be greater than 24 inches and consistent with submitted mixture test parameters plus or minus 2 in.
4. Measure passing ability in accordance with ASTM C 1621/C 1621M. Use the slump cone in the same way as in the slump flow test. Difference in average slump flow between slump flow and passing ability tests shall not exceed 2 in.
5. Determine the static segregation (stability) in accordance with ASTM C 1610/C 1610M. Segregation factor of the mixture shall not be more than 15 percent.

M. Engineer's acceptance of mixture proportions shall not relieve Contractor from responsibility for any variation from requirements of Contract Documents unless Contractor has in writing called Engineer's attention to each such variation at time of submission and Engineer has given written approval of each such variation.

N. Adjustment to Concrete Mixtures: Adjustments to mixture proportions may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Engineer. Laboratory test data for revised mixture and strength results shall be submitted to and accepted by Engineer before using in work.

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information. Truck mixing prohibited. Mix at plant.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Provide plant-printed batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mixture identification number, date, time of batching, mixing time, quantity and details of materials, amount of water introduced and water permitted by plant to be added, if any.

2.10 TOOLS

A. Slab Jointing

1. Concrete groovers: For tooled joints in concrete:
 - a. For concrete not exceeding 4 in. thickness, use groover with 1 in. deep v-cut bit, 0.5 in. surface width and 3/16 in. to 1/4 in. edge radius.
 - b. For concrete exceeding 4 in. thickness, use groover with 1.5 in. deep v-cut bit, 0.5 in. surface width and 3/16 in. to 1/4 in. edge radius.
2. Saw Cut Joints:
 - a. Prohibited. Joints shall be tooled in plastic concrete.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads and in accordance with Article 1.5 "Contractor's Professional Services – Performance and Design Criteria".
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117, except as modified below:
 1. Piers, Columns, Walls, Beams, and Slabs:
 - a. Variation in cross-sectional dimensions of piers, beams and columns and in thickness of walls and slabs: 12 in. or less: Plus 0.375 in., minus 0.25 in. Greater than 12 in.: Plus 0.5 in., minus 0.375 in.
 - b. Variation in elevation from specified elevation for piers, columns and walls: Plus or minus 0.5 in.
- C. Construct forms tight enough to prevent loss of concrete mortar.
- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 1. Install keyways, Reglets, recesses, and the like, for easy removal.
 2. Kerf wood inserts for easy removal.
 3. Do not use rust-stained steel form-facing material.

- E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates, or compacting-type screeds.
- F. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- G. Chamfer exterior corners and edges of permanently exposed concrete.
- H. Do not chamfer corners or edges of concrete.
- I. Form openings, chases, offsets, sink ages, keyways, Reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Re-tighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 REMOVING AND REUSING FORMS

- A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.
- B. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved the following:
 - 1. At least 75 percent of 28-day design compressive strength.
 - 2. For post-tensioned concrete, formwork shall remain in place until post-tensioning has been completed. Do not place additional loads on structure until concrete has been properly reshored.
 - 3. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

- D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces.

3.3 SHORES AND RESHORES

- A. Comply with ACI 347.2, ACI 318, and ACI 301, for design, installation, and removal of shoring and reshoring and in accordance with Article 1.5 "Contractor's Professional Services – Performance and Design Criteria".
- B. Extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain specified concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on continuous bar supports spaced at 2 ft. o.c., maximum. Lap edges and ends of adjoining sheets per ACI 318 and as follows:
 - 1. Length of overlap measured between outermost cross wires of each sheet shall not be less than one spacing of cross wires plus two inches nor less than one and one-half times the development length nor 6 in. minimum where development length is calculated per section 12.8 of ACI 318.
 - 2. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
- F. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963.
 - 1. Rest epoxy coated steel member supported from formwork on all-plastic bar supports.
 - 2. Fasten epoxy-coated steel members with nylon-, epoxy-, or plastic-coated tie wire, or other suitable material acceptable to Engineer.

3. Mechanical connections, when required, shall be installed in accordance with splice device manufacturer's recommendations. Repair any damage to coating.
4. All parts of mechanical connections on epoxy-coated steel, including steel splice sleeves, bolts, and nuts shall be coated with same material used for repair of coating damage.
5. Repair all damage to epoxy coating to bars, welded wire reinforcement, and all other epoxy coated items. Use a mirror to view undersides of all items for possible damage so it can be repaired.
6. Do not cut epoxy-coated steel unless permitted by Engineer. When cut, coat ends with material used for repair of coating damage.

G. Splices:

1. Provide standard reinforcement splices by lapping ends, placing bars in contact, and tying tightly with wire. Comply with requirements of ACI 318 for minimum lap of spliced bars.
2. For mechanical tension splices of reinforcement:
 - a. Column bar lengths shall not exceed 30 ft. between splices. In any bar, no splices shall occur at any floor level.
 - b. Exercise care to assure that no reduction of cross-sectional area of reinforcement occurs.
 - c. For all mechanical splices, perform splicing in strict accordance with manufacturer's requirements and instructions.
 - d. Stagger splices in adjacent bars.
 - e. Welding of steel reinforcement prohibited.
3. Compression splices: Mechanically coupled splices in accordance with ACI 318, Chapter 12.
4. Welded wire reinforcement shall not extend through contraction joints.

3.5 JOINTS

A. Joints in Concrete (ACI 301, Section 5):

1. Construction, control, and isolation joints shall be provided to maintain existing joint layout in repair areas, and as shown on Drawings.
2. Confirm acceptable joint profile with Engineer and sealant manufacturer prior to placement of any repair materials.
 - a. Tool joints at time of finishing. Tool: Part 2 Article "Tools."
 - b. Saw Cut Joints: Prohibited.
 - c. Isolation joints: Interrupt structural continuity resulting from bond, reinforcement or keyway as detailed. Confirm with Engineer.

- B. Provide keyways at least 1-1/2 in. deep in construction joints in walls and slabs. Accepted bulkheads designed for this purpose may be used for slabs.

- C. Use bonding grout, containing the specified bonding admixture, on existing concrete surfaces that will be joined with fresh concrete. Confirm compatibility with galvanic anode manufacturer, if utilized.
- D. Isolation Joints in Slabs-on-Ground: Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere. Confirm with Engineer.
 - 1. Joint filler and sealant materials are specified in Division 7 Sections of these Specifications.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork and reinforcement is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement, unless approved in writing by Engineer/Architect.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mix.
- C. Check air content after any site addition of admixtures to increase slump.
- D. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.
- E. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.
 - 1. Consolidate placed concrete with mechanical vibrating equipment. Use plastic or rubber-tipped vibrators when concrete reinforcement is epoxy-coated.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically (in thin slabs vibrator may be inserted at angle or horizontally to keep vibrator head completely immersed) inserted at uniformly spaced locations no farther than 1.5 times action radius so area visibly affected by vibrator overlaps adjacent previously vibrated area by 3-4 inches. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration (usually 5 to 15 seconds) of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge or motor driven vibrating screed and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using highway bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- G. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Use only the specified non-corrosive accelerator. Do not use calcium chloride, salt, or other materials containing anti-freeze agents or chemical accelerators, unless otherwise specified and approved in mixture proportions.
- H. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FINISHING FORMED SURFACES

- A. As-Cast Finishes: As-cast concrete texture imparted by form-facing material in accordance with ACI 301 and as specified below in accordance with Class of Finish:
 - 1. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding limits for class of surface specified.

- a. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing or painting.
 - b. Provide class B finish as described in ACI 347. Class B permits gradual or abrupt irregularities of 1/4 inch.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

- A. Flatwork in Parking and Drive Areas (BROOM Finish, ACI 301, Section 5 header "Broom or Belt Finish":
 - 1. Bullfloat immediately after screeding. Complete before any excess moisture or bleed water is present on surface (ACI 302.1R, Article 8.3.3). The use of power trowels is discouraged; however, if they are used the following applies:
 - a. Use minimal passes so as to not overwork the concrete.
 - b. At the contractor's expense a petrographic analysis will be required in each area where a power trowel is used to verify the air content at the slab surface is within specified limits.
 - 2. After excess moisture or bleed water has disappeared and concrete has stiffened sufficiently to allow operation, give slab surfaces coarse transverse scored texture by drawing broom across surface. Texture shall be as accepted by Owner/Engineer.
 - 3. Finish tolerance: ACI 301, Paragraph 5.3.4.2 and ACI 117, paragraph 4.8.6: The gap at any point between the straightedge and the floor (and between the high spots) shall not exceed 0.5 in. In addition, floor surface shall not vary more than plus or minus 0.75 in. from existing or approved elevations, and as noted on Drawings anywhere on floor surface.
 - 4. Finish all concrete slabs to proper elevations to ensure that all surface moisture will drain freely to floor drains, and that no puddle areas exist. Contractor shall bear cost of any corrections to provide for positive drainage.
- B. Flatwork in Stair towers and enclosed, Finished Areas (Float Finish, ACI 301, Paragraph 5.3.4.2.b):
 - 1. Give slab floated finish. Texture shall be as accepted by Owner/Engineer from sample panels.
 - 2. Finishing tolerance ACI 301, Section 5 header "Measuring Tolerances for Slabs" and ACI 117, paragraph 4.8.6: The gap at any point between the straightedge and the floor (and between the high spots) shall not exceed 0.5 in. In addition, floor surface shall not vary more than plus or minus 3/8 in. from existing elevations and as noted on Drawings anywhere on floor surface.

C. Flatwork in Stair towers and Parking Garage floor subject to pedestrian traffic:

1. Concrete surfaces at all walking areas subject to pedestrian traffic shall provide a smooth, slip-resistant walking surface for pedestrians with these minimum requirements:
 - a. Shall provide walking surfaces in accordance with ASTM – F 1637 Standard Practice for Safe Walking Surfaces and “Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)”, and ICC A117.1.
 - b. Adjoining walkway surfaces shall be flush and meet the following minimum requirements:
 - 1) Changes in level of less than $\frac{1}{4}$ inch in height may be without edge treatment as shown in ADA Figure 303.2.
 - 2) Changes in Level between $\frac{1}{4}$ inch and $\frac{1}{2}$ inch in height shall be beveled with a slope no greater than 1:2 as shown in ADA Figure 303.3.
 - 3) Changes in level greater than $\frac{1}{2}$ inch in height are not permitted unless they can be transitioned by means of a ramp within minimum ADA guidelines.
 - 4) Openings in floor or ground surfaces shall not allow passage of a sphere more than $\frac{1}{2}$ inch diameter except as allowed for elevators and platform lifts as shown in ADA Figure 302.3.
 - c. Walkway surfaces shall provide a slip resistant surface.
 - 1) Concrete surfaces shall be troweled and finished to provide a slip-resistant finish.
 - 2) Contractor shall provide sample area with slip-resistant surface finish for Owner/Engineer approval.

3.9 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still workable and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

3.10 CONCRETE PROTECTION AND CURING

- A. General: Comply with ACI 308.1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

- B. Evaporation Reducer: Apply evaporation reducer to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb. /sq. ft. /h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing. Do not finish immediately after evaporation reducer applied. Wait until after colored tint disappears.
- C. Formed Surfaces: Cure formed concrete surfaces of columns, walls, and upturned beams, including the underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Tepid (within 20 deg F of concrete temperature) water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 3. Curing compound prohibited when concrete has specified water-cementitious materials ratio less than or equal to 0.40 or air temperature above 80 deg F. Use moist cure instead.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Tepid (within 20 deg F of concrete temperature) water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

- a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.
3. Curing Compound: Prohibited when concrete has specified water-cementitious ratio less than or equal to 0.40 or air temperature above 80 deg F. Use moist cure instead.

3.11 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Engineer/Architect. Remove and replace concrete that cannot be repaired and patched to Engineer/Architect's approval.
- B. Comply with other work item(s) and specification sections regarding partial- and full-depth concrete repairs as applicable.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than ½ inch in any dimension in solid concrete but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with specified bonding agent. Fill and compact with specified patching mortar before specified bonding agent has dried. Fill form-tie voids with specified patching mortar or cone plugs secured in place with specified bonding agent.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 1. Repair finished surfaces containing defects. Surface defects include spalls, pop-outs, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding, only with Engineer approval.
 3. Correct localized low areas with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

4. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete or repair material as approved by the Engineer. Remove defective areas with clean, square cuts and expose steel reinforcement with at least $\frac{3}{4}$ inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 5. Repair single holes 1 inch or less in diameter with patching mortar. Cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
 6. Repair isolated random cracks that have little movement and single holes not over 1 in. in diameter in accordance with procedures and materials specified in Division 7 Section "Concrete Joint Sealants." Receive Engineer's written acceptance of methods and materials selected prior to application.
- E. Perform structural repairs of concrete, subject to Engineer/Architect's approval, using materials as approved by the Engineer.

3.12 FIELD QUALITY CONTROL

- A. Owner will employ a testing laboratory to perform tests and to submit test reports.
- B. Sample concrete in accordance with ASTM C 172.
- C. Epoxy Coated Material:
1. Perform field inspection of installed epoxy coated material.
 2. Repair all epoxy coating damage due to fabrication and handling, using a mirror to find any damage on undersides.
 3. Repair all damaged areas using manufacturer's recommended patching material and method.
 4. No damaged area shall be left uncorrected.
- D. Temperature:
1. Test temperature of concrete in accordance with ASTM C 1064/C 1064M and ACI 301 each time cylinders are taken or as directed by the Engineer.
- E. Slump Test:
1. Conduct one slump test in accordance with ASTM C 143/C 143M per truck load of ready-mixed concrete delivered to Project.
 2. When high-range water-reducing admixture (superplasticizer) is used, initial slump must be verified by Testing Agency.

F. Slump Flow Test (if SCC is utilized):

1. Conduct one slump flow test at truck in accordance with ASTM C 1611/C 1611M per truck load of ready mixed concrete delivered to Project.

G. Air Content:

1. General Contractor: Coordinate all parties involved to produce conforming concrete.
2. Sample freshly-mixed concrete at point of final placement (after pumping) in accordance with ASTM C 172 and **conduct one air content test** in accordance with ASTM C 231 or ASTM C 173 **for each truck of ready-mix, air entrained concrete delivered to Project.**
 - a. At contractor's option, air content may also be tested at truck (before pumping) to correlate effect of pumping on final in place air content.
3. Also, sample fresh concrete immediately following placement and screeding and conduct air content tests in accordance with ASTM C 231 or ASTM C 173 at rate of one for every 10 truckloads of ready-mix, air-entrained concrete delivered to Project. For small or half-loads, obtain Engineer's acceptance of procedure 2 weeks before situation arises.

H. Concrete Compressive Strength:

1. Make test cylinders in accordance with ASTM C 31 and test in accordance with ASTM C 39 as follows:
 - a. Take minimum of three sets of cylinders for each 100 cu yds. or fraction thereof, of each Mixture of concrete placed in any one day.
 - b. A set of cylinders shall be comprised of two 6 inch by 12 inch cylinders or three 4 inch by 8 inch cylinders.
 - c. At Contractor's option and cost, additional cylinders may be taken to verify concrete strength prior to form removal.
 - d. Testing Agency: Provide and maintain site cure box for cylinders.
2. Sample plastic concrete for testing at point of final placement, in accordance with ASTM C 172. Engineer will select sampling locations which may include points where plastic concrete has already been screeded and floated. Sample concrete for test cylinders to be used to verify concrete compressive strength for post-tensioning as near as possible to actual tendon anchorages.
3. Cover specimens properly, immediately after finishing. Protect outside surfaces of cardboard molds, if used, from contact with sources of water for first 24 hours after molding.
4. Cure test cylinders per ASTM C 31 as follows:
 - a. To verify compressive strength prior to post-tensioning or form removal or for additional test cylinders required due to cold weather concreting conditions:

- 1) Store test specimens on structure as near to point of sampling as possible and protect from elements in same manner as that given to portion of structure as specimen represents.
 - 2) Transport to test laboratory no more than 4 hours before testing. Remove molds from specimens immediately before testing.
 - b. To verify 28-day compressive strength:
 - 1) During first 24 hours after molding, store test specimens under conditions that maintain temperature immediately adjacent to specimens in range of 60 to 80 degrees F. and prevent loss of moisture from specimens.
 - 2) Remove test specimens from molds at end of 20 +/- 4 hours and store in moist condition at 73.4 +/- 3 degrees F. until moment of test. Laboratory moist rooms shall meet requirements of ASTM C 511.
5. Compression test for non-prestressed concrete:
 - a. Test one set of cylinders at 7 days.
 - b. Test one set of cylinders at 28 days.
 - c. Hold one set of cylinders in reserve for 56 days.
6. Compression tests for post-tensioned concrete:
 - a. Test one set of cylinders immediately before tensioning slabs and beams. Cylinders must be field cured in accordance with paragraph "Cure test cylinders per ASTM C 31...."
 - b. Test one set of cylinders at 28 days.
 - c. Hold one set of cylinders in reserve for 56 days.
7. Unless notified by Engineer, reserve cylinders may be discarded without being tested after 56 days.
- I. Testing for the presence of the Calcium Nitrite admixture in the concrete shall conform to APPENDIX at end of this section for plastic concrete testing.
- J. Testing for the presence of MCI admixture in the concrete shall be per manufacturer's recommendations.
- K. Report all nonconforming test results to Engineer and others on distribution lists via fax or email. Follow up with colored paper copies to flag the non-conformances.
- L. Monthly, submit a graph showing distribution of compressive strength test results and air content test results. Include microwave test results for concretes with a water cementitious ratio less than or equal to 0.40 concrete.

3.13 EVALUATION AND ACCEPTANCE OF CONCRETE

- A. Concrete Compression test will be evaluated by Engineer in accordance with ACI 301. If number of tests conducted is inadequate for evaluation of concrete or test results for any type of concrete fail to meet specified strength requirements, core tests may be required as directed by Engineer. Air content and parameters of air-void system shall meet requirements of this Section.
- B. Core tests, when required, in accordance with ASTM C42 and ACI 301.
- C. Should tested hardened concrete meet Specifications, Owner will pay for coring and testing of hardened concrete. Should tested hardened concrete not meet Specifications or should concrete have to be tested because Contractor did not conform to Project specifications, Contractor shall pay for coring and testing of hardened concrete and for any corrective action required for unaccepted concrete.

3.14 ACCEPTANCE OF STRUCTURE

- A. Acceptance of completed concrete Work will be according to provisions of ACI 301.
- B. Concrete rejected due to entrained air content below specified limit will be accepted if any of following conditions are met:
 - 1. ASTM C 457: Three concrete specimens tested in accordance with ASTM C 457 meet air void parameters of Part 2.
 - 2. ASTM C 457: Three concrete specimens tested shall meet air void parameters of concrete reported and approved by Engineer in Part 1.
 - 3. ASTM C 666, Test Procedure A: Test three concrete specimens removed from structure. Concrete specimens tested shall have durability characteristics similar to that reported in Part 1.

END OF SECTION 033000

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APPENDIX: Test method for Calcium Nitrite presence in plastic concrete.

A. Scope

This Method of Test is used to determine the presence of calcium nitrite in the plastic concrete state. A freshly mixed concrete sample shall be tested. Quantofix test strips, for high range nitrite, manufactured by Macherey-Nagel Inc. of Bethlehem, PA or equivalent, shall be used.

For each day's operation, unless directed otherwise, a minimum of one test shall be performed.

B. Apparatus

Quantofix Test Strips for high range nitrite #91322
Macherey-Nagel Inc. (888) 321-6224

10cc disposable syringes with Leur-Lok tip #309604
Becton-Dickinson & Co (201) 847-6800

Disposable Filters 25mm/.45 micron # SLHA02510
Millipore (800) 645-5476

Wide-mouth Container

Clean Measuring Cup

C. Procedure

1. Determine the amount of concrete to be tested based on the design amount of Calcium Nitrite and the table below. Add concrete to pre-measured 0.5 gallons of water in a wide mouth container. Use the water in the container to rinse out the measuring cup.
2. Shake the container for 2 to 5 minutes until contents are well mixed.
3. Using the syringe, uptake approximately 10 milliliters of extraction water from the container. Attach a disposable filter to the end of the syringe.
4. Filter the extraction water into a clean cup.
5. Dip the test strip into the clear, filtered extraction water and compare the color to the chart on the side of the test strip container.
6. Using the table below determine if the reading on the test strips corresponds with the expected reading for the design amount of Calcium Nitrite.

<u>Design Amount of Calcium Nitrite, gal/CY</u>	<u>Volume of Concrete to be Added, oz.</u>	<u>Expected Reading on Test Strip</u>
2.0	8	0.3
2.5	6	0.3
3.0	5	0.3
3.5	4	0.3
4.0	8	0.6
4.5	7	0.6
5.0	6	0.6

Notes:

1. Column 1 indicates the amount of calcium nitrite, in gallons, that has been added to a cubic yard of concrete.
2. Column 2 indicates the amount of concrete that should remain in the container after shaking.
3. Column 3 is the test strip reading that will correspond to the indicated quantity of calcium nitrite.

D. Verification Requirements for Calcium Nitrite Dispensing Systems:

1. Independent Testing agency shall perform the 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, corrosion inhibitor manufacturer/supplier, and concrete producer. Volume used should be within plus or minus 10 percent of specified amount.

CONCRETE MIXTURE PROPORTIONS SUBMITTAL FORM

Mixture #
Project Name:

I. GENERAL INFORMATION:	
Project:	City:
General Contractor:	
Concrete Supplier:	
Mixture Identification No.:	Concrete Grade:
Use (Describe) ¹ :	

¹ example: Footings, interior flatwork, floor slabs, topping, columns, etc.

II. MIXTURE PROPORTIONING DATA:		
Proportioning Based on (Check only one):		
Standard Deviation Analysis: ____ (see section VIII)		
or Trial Mix Test Data: ____ (see Section IX)		
Mixture Characteristics: (see Mixtures in Drawings General Notes)	Density: ____ pcf;	Air: ____ % specified
	Slump ____ in. before superplasticizer	Slump ____ in. after superplasticizer Or for SCC: Spread ____ in.
	Strength: ____ psi (28 day);	

WALKER SUBMITTAL STAMP

CONTRACTOR

SUBMITTAL STAMP

CONCRETE MIXTURE PROPORTIONS SUBMITTAL FORM

Mixture #
Project Name:

III. MATERIALS:		
Aggregates: (size; type; source; gradation report; specification)		
Coarse:		
Fine:		
Other Materials:	Type	Product-Manufacturer (Source)
Cement:		
Fly ash, slag, or other pozzolan:		
Silica Fume		
Processed Ultra Fine Fly Ash		
HRM		
Air Entraining Agent:		
Water Reducer		
High Range Water Reducer (HRWR / superplasticizer)		
Non-Corrosive Accelerator		
Retarder		
Fibers		
Other(s):		

IV. MIX PROPORTIONS ⁽²⁾		
	WEIGHT (lbs.) (per yd ³)	ABSOLUTE VOL. (cu. ft.) (per yd ³)
Cement:		
Fine Aggregate: ⁽³⁾		
Coarse Aggregate: ⁽³⁾		
Fly ash, slag, or other pozzolan:		
Silica Fume		
Processes Ultra-Fine Fly Ash		
HRM		
Water: ⁽⁴⁾ (gals. & lbs.)		
Entrained Air: (oz.)		
Fibers:		
(Other) _____:		

TOTALS:		
NOTES:		
⁽²⁾ Mix proportions indicated shall be based on data used in section VII or IX.		
⁽³⁾ Based on saturated surface dry weights of aggregates.		
⁽⁴⁾ Includes ALL WATER, including added water and free water contained on aggregates.		

CONCRETE MIXTURE PROPORTIONS SUBMITTAL FORM

Mixture #
Project Name:

V. <u>RATIOS</u>		VI. SPECIFIC GRAVITIES	
Water ⁽¹⁾	lb.	Fine Aggregate:	
=	=	Coarse Aggregate:	
Cementitious Material ⁽²⁾	lb.		
Fine Agg.	lb.		
=	=		
Total Agg.	lb.		
<p>NOTES:</p> <p>(1)Includes ALL water, including added water and free water contained on aggregates.</p> <p>(2)Cementitious materials include cement, fly ash, slag, silica fume, HRM, Processed Ultra-Fine Fly Ash or other pozzolan.</p>			

VII. <u>ADMIXTURES</u>					
Air Entraining Agent (A.E.A.):	___ oz.	per yd ³	___ oz.	per 100# cement	
Superplasticizer	___ oz.	per yd ³	___ oz.	per 100# cement	
Water Reducer	___ oz.	per yd ³	___ oz.	per 100# cement	
Non-corrosive Accelerator	___ oz.	per yd ³	___ oz.	per 100# cement	
Retarder	___ oz.	per yd ³	___ oz.	per 100# cement	
Other	___ oz.	per yd ³	___ oz.	per 100# cement	
Lithium Nitrate	___ gal.	per yd ³			

CONCRETE MIXTURE PROPORTIONS SUBMITTAL FORM

Mixture #
Project Name:

VIII. <u>STANDARD DEVIATION ANALYSIS:</u>	<u>Yes</u>	<u>N/A</u>
(Complete this section only if Mixture was developed using standard deviation analysis of previous project test results. If other method was used, check "N/A".)		
<u>Number of Tests Evaluated:</u> <u>(One test is average of two cylinder breaks)</u>	<u>Standard Deviation:</u> <u>(Single Group)</u>	
<u>Attach copy of test data considered:</u>	<u>Standard Deviation:</u> <u>(Two Groups)</u>	
Required average compressive strength: $f'_{cr} = f'_c + \rule{1.5cm}{0.4pt}$ psi		
<p>NOTE:</p> <p>Mixture shall be proportioned in accordance with ACI 301 section 4.2.3 to achieve average compressive strength f'_{cr} equal to or greater than the larger of one of the following equations:</p> <p>(4.-3) $f'_{cr} = f'_c + 1.34ks$ [s= calculated standard deviation] or (4-4) $f'_{cr} = f'_c + 2.33ks - 500$ or (4-5) $f'_{cr} = 0.9f'_c + 2.33ks$ (for $f'_c > 5,000$ psi)</p> <p>(Refer to ACI 301 for required average when data are not available to establish standard deviation. For post-tensioning projects, see also special requirements for strength required to apply initial post-tensioning.)</p>		
MIXTURE CHARACTERISTICS (As shown on drawings)		
Slump = <u> </u> in.	Air Content = <u> </u> %	
Unit Wet Wt. = <u> </u> pcf	Unit Dry Wt. = <u> </u> pcf	
MIXTURE CHARACTERISTICS (Based on proportioning data)		
Initial Slump = <u> </u> in.	Final Slump <u> </u> in.	
Unit Wet Wt.= <u> </u> pcf.	Unit Dry Wt. = <u> </u> pcf.	
Air Content = <u> </u> %		

CONCRETE MIXTURE PROPORTIONS SUBMITTAL FORM

Mixture #
Project Name:

IX. <u>TRIAL MIXTURE TEST DATA:</u>		<u>Yes</u>	<u>N/A</u>
(Complete this section only if Mixture Proportion is based on data from trial test mixture(s) batched by testing agency or Contractor. If other method was used, check "N/A".)			
<u>Age</u> (days)	<u>Mix #1</u> (comp. str.)	<u>Mix #2</u> (comp. str.)	<u>Mix #3</u> (comp. str.)
<u>7</u>			
<u>7</u>			
<u>28</u>			
<u>28</u>			
<u>28</u>			
<u>28</u> day average compressive strength, psi			
<p>NOTE:</p> <p>Mixture shall be proportioned in accordance with ACI 301 section 4.2.3 to achieve average compressive strength f'_{cr} equal to or greater than the larger of one of the following equations:</p> <p>(Less than 3000) $f'_{cr} = f'_c + 1000$ or (3000 to 5000) $f'_{cr} = f'_c + 1200$ or (Over 5000) $f'_{cr} = 1.1f'_c + 700$</p> <p>For post-tensioning projects, see also special requirements for strength required to apply initial post-tensioning.</p>			
MIXTURE CHARACTERISTICS (as shown on drawings)			
Slump = _____ in.		Air Content = _____ %	
Unit Wet Wt. = _____ pcf		Unit Dry Wt. = _____ pcf	
MIXTURE CHARACTERISTICS (Based on proportioning data)			
Initial Slump = _____ in.		Final Slump _____ in.	
Unit Wet Wt. = _____ pcf.		Unit Dry Wt. = _____ pcf.	
Air Content = _____ %			

CONCRETE MIXTURE PROPORTIONS SUBMITTAL FORM

Mixture #
Project Name:

X. <u>OTHER REQUIRED TESTS</u>		
Water Soluble Chloride Ion Content of mix:	_____ % (by weight of cement)	ASTM C 1218
Hardened Air Content (per ASTM C457):		
Air content: _____%	Air void spacing Factor _____ in.	Specific surface: _____ in ² /in ³
Chloride Ion Content of Concrete Mixture: ASTM C 1218		
Shrinkage (Length Change, Average) per ASTM C157:		
_____ % @ 4 days	_____ % @ 7 days	_____ % @ 14 days
_____ % @ 21 days	_____ % @ 28 days	

XI. <u>Remarks:</u>

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Ready Mix Concrete Supplier Information
Name:
Address:
Phone Number:
Date:
Main Plant Location:
Miles from Project Site:
Secondary or Backup Plant Location:
Miles from Project Site:

My signature below certifies that I have read, understood, and will comply with the requirements of this Section.

Signature _____

Typed or Printed Name

CONCRETE MIXTURE PROPORTIONS SUBMITTAL FORM

Mixture #
Project Name:

REQUIRED ATTACHMENTS	
	Coarse aggregate grading report
	Fine aggregate grading report
	Concrete compressive strength data used for calculation of required average strength and for calculation of standard deviation
	Chloride ion data and related calculations
	Admixture compatibility certification letter
	Shrinkage information per ASTM C157
	ASTM C 457
	Alkali Content Data and Calculations OR ASTM C1293, ASTM C 1567 or Test report for each aggregate

SECTION 033713 - SHOTCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes shotcrete applied by the dry-mix or wet-mix process.
- B. This Section includes the provision of all labor, materials, supervision, and incidentals necessary to install shotcrete to horizontal, vertical, and overhead surfaces to restore original surface condition and integrity.

1.3 DEFINITIONS

- A. Shotcrete: Mortar or concrete pneumatically projected onto a surface at high velocity.
- B. Dry-Mix Shotcrete: Shotcrete with most of the water added at nozzle.
- C. Wet-Mix Shotcrete: Shotcrete with ingredients, including mixing water, mixed before introduction into delivery hose.

1.4 SUBMITTALS

- A. Product Data: For manufactured materials and products including reinforcement and forming accessories, shotcrete materials, admixtures, and curing compounds.
- B. Shop Drawings: For details of fabricating, bending, and placing reinforcement. Include support and anchor details, number and location of splices, and special reinforcement required for openings through shotcrete structures.
- C. Samples: Approximately 24 by 24 by 2 inches (600 by 600 by 50 mm), to illustrate quality of finishes, colors, and textures of exposed surfaces of shotcrete.
 - 1. Approved samples may be incorporated into final work. Remove and replace samples until approval is obtained.
- D. Design Mixes: For each shotcrete mix.
- E. Material Test Reports: For shotcrete materials.

- F. Material Certificates: For each material item, signed by manufacturers.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Shotcrete contractor shall have a minimum of three (3) years experience in the application performed. All Nozzlemen to perform work shall have a current ACI / ASA Nozzlemen Certification. A qualified installer employing nozzle operators who attain mean core grades not exceeding 2.5, according to ACI 506.2, on preconstruction tests.
- B. Testing Agency Qualifications: Independent and qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548, and acceptable to authorities having jurisdiction.
- C. Comply with provisions of the following, unless more stringent requirements are indicated:
1. ACI 301, "Specification for Structural Concrete."
 2. ACI 506.2, "Specification for Shotcrete."
 3. CRSI's "Manual of Standard Practice."
- D. Preconstruction Testing Service: Owner may engage a qualified independent testing agency to perform preconstruction testing and inspections indicated below:
1. Produce test panels before shotcrete placement according to requirements in ACI 506.2 and ASTM C 1140 for each design mix, shooting orientation, and nozzle operator. Produce test panels with dimensions of 24 by 24 inches (600 by 600 mm) minimum and of average thickness of shotcrete, but not less than 3-1/2 inches (90 mm). From each test panel, testing agency will obtain six test specimens: one set of three specimens unreinforced and one set of three specimens reinforced. Agency will perform the following:
 - a. Test each set of unreinforced specimens for compressive strength according to ASTM C 42.
 - b. Visually inspect each set of reinforced shotcrete cores taken from test panels and determine mean core grades according to ACI 506.2.
- E. Mockups: Before installing shotcrete, construct mockups for each finish required and for each design mix, shooting orientation, and nozzle operator to demonstrate aesthetic effects and set quality standard for installation.
- F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Sections.

1.6 PROJECT CONDITIONS

- A. Cold-Weather Shotcreting: Protect shotcrete work from physical damage or reduced strength caused by frost, freezing, or low temperatures according to ACI 306.1 and as follows:
1. Discontinue shotcreting when ambient temperature is 40 deg F (4.4 deg C) and falling. Uniformly heat water and aggregates before mixing to obtain a shotcrete shooting temperature of not less than 50 deg F (10 deg C) and not more than 90 deg F (32 deg C).
 2. Do not use frozen materials or materials containing ice or snow.
 3. Do not place shotcrete on frozen surfaces or surfaces containing frozen materials.
 4. Do not use calcium chloride, salt, and other materials containing anti-freeze agents.
- B. Hot-Weather Shotcreting: Mix, place, and protect shotcrete according to ACI 305R when hot-weather conditions and high temperatures would seriously impair quality and strength of shotcrete, and as follows:
1. Cool ingredients before mixing to maintain shotcrete temperature at time of placement below 100 deg F (38 deg C) for dry mix or 90 deg F (32 deg C) for wet mix.
 2. Decrease temperature of reinforcing steel and receiving surfaces below 100 deg F (38 deg C) before shotcreting.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms: Form-facing panels that will provide continuous, straight, smooth, concrete surfaces. Furnish panels in largest practicable sizes to minimize number of joints.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Plain-Steel Wire: ASTM A 82, as drawn.
- C. Plain-Steel-Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- D. Supports: Bolsters, chairs, spacers, ties, and other devices for spacing, supporting, and fastening reinforcing steel in place according to CRSI's "Manual of Standard Practice" and as follows:
1. Use all-plastic bar supports.

- E. Reinforcing Anchors: ASTM A 36/A 36M, unheaded rods or ASTM A 307, Grade A (ASTM F 568, Property Class 4.6), hex-head bolts; carbon steel; and carbon-steel nuts.

1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

2.3 SHOTCRETE MATERIALS

- A. Shotcrete Cement and Blended Cements

1. Portland Cement: ASTM C 150, Type I, I/II or III. Use only one brand and type of cement for Project. Select supplementary cementing materials from subparagraphs below, if permitted. Blending of fly ash, slag, silica fume, with Portland cement is done at ready-mix plant.
2. Fly Ash: ASTM C 618, Class F.
3. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
4. Silica Fume: ASTM C 1240, amorphous silica.

- B. Acceptable Blended Shotcrete Cement:

1. Gun-Rite Cement: JE Tones, Blue Island, IL

- C. Normal-Weight Aggregates: ASTM C 33, from a single source, and as follows:

1. Aggregate Gradation: ACI 506R, Gradation No. 2 with 100 percent passing 1/2-inch (13-mm) sieve.
2. Coarse-Aggregate Class: 3S.

- D. Coloring Agent: ASTM C 979, synthetic mineral-oxide pigments or colored, water-reducing admixtures, free of carbon black; color stable, nonfading, and resistant to lime and other alkalis.

1. Color: Match existing adjacent surfaces to satisfaction of Owner.

- E. Water: Potable, complying with ASTM C 94, free from deleterious materials that may affect color stability, setting, or strength of shotcrete.

- F. Carbon-Steel Fiber: ASTM C 1116, Type 1, carbon-steel fiber and ASTM A 820, Type 1, cold-drawn wire, not less than 1 inch (25 mm) long.

- G. Synthetic Fiber: Fibrillated polypropylene fibers engineered and designed for use in shotcrete, complying with ASTM C 1116, Type III, not less than 1/2-inch (12 mm) long.

- H. Ground Wire: High-strength steel wire, 0.8 to 1 mm in diameter.

2.4 CHEMICAL ADMIXTURES

- A. General: ASTM C 1141, Class A or B, but limited to the following admixture materials. Provide admixtures for dry-mix or wet-mix shotcrete that contains not more than 0.1 percent chloride ions. Certify compatibility of admixtures with each other and with other cementitious materials.
 - 1. Air-Entraining Admixture: ASTM C 260.
 - 2. Water-Reducing Admixture: ASTM C 494, Type A.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 - 4. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
 - 5. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
 - 6. Accelerating Admixture: ASTM C 494, Type C.
- B. Blended Admixture:
 - 1. Gun-Rite HP, JE Tomes, Blue Island, IL.

2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.6 SHOTCRETE MIXES, GENERAL

- A. Prepare design mixes for each type and strength of shotcrete.
 - 1. Limit use of fly ash, ground granulated blast-furnace slag, and silica fume to not exceed, in combination, 25 percent of portland cement by weight.
- B. Limit water-soluble chloride ions to maximum percentage by weight of cement or cementitious materials permitted by ACI 301.
- C. Admixtures: When included in shotcrete design mixes, use admixtures and retarding admixtures according to manufacturer's written instructions.
- D. Carbon-Steel or Synthetic Fiber (if utilized): Uniformly disperse in shotcrete mix, according to manufacturer's written instructions.

- E. Design-Mix Adjustments: Subject to compliance with requirements, shotcrete design-mix adjustments may be proposed when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.7 NORMAL-WEIGHT SHOTCRETE MIXES

- A. Proportion dry mixes by field test data methods and wet mixes according to ACI 211.1 and ACI 301, using materials to be used on Project, to provide normal-weight shotcrete with the following properties:
1. Compressive Strength (28 Days): 5,000 psi (34.5 MPa).
 2. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight, wet-mix shotcrete having an air content before pumping of 7 percent with a tolerance of plus or minus 1-1/2 percent.
- B. Acceptable pre-packaged fiber reinforced shotcrete mixes:
1. "Eucoshot F", (Dry or Wet Method) by The Euclid Chemical Company, Cleveland, OH.
 2. "Gun-Rite 5000" (Wet Method), by JE Tomes & Associates, Blue Island, IL.
 3. "Gun-Rite HP", (Wet Method), by JE Tomes & Associates, Blue Island, IL.
 4. "Gun-Rite DS-1", (Dry Method) by JE Tomes & Associates, Blue Island, IL.
 5. "MS-D1 Shotcrete", (Dry Method), by King Packaged Materials Company, Burlington, ON.
 6. "MasterEmaco S 211 SP", (Dry or Wet Method), by BASF Construction Chemicals, Shakopee, MN.
 7. "Sikacem 103F", (Dry or Wet Method) by Sika Corporation, Lyndhurst, NJ.
 8. "Sikacem 133F", (Dry Method) by Sika Corporation, Lyndhurst, NJ.

2.8 SHOTCRETE EQUIPMENT

- A. Mixing Equipment: Capable of thoroughly mixing shotcrete materials in sufficient quantities to maintain continuous placement.
- B. Dry-Mix Delivery Equipment: Capable of discharging aggregate-cement mixture into delivery hose under close control and maintaining continuous stream of uniformly mixed materials at required velocity to discharge nozzle. Equip discharge nozzle with manually operated water-injection system for directing even distribution of water to aggregate-cement mixture.
1. Provide uniform, steady supply of clean, compressed air to maintain constant nozzle velocity while simultaneously operating blow pipe for cleaning away rebound.
 2. Provide water supply with uniform pressure at discharge nozzle to ensure uniform mixing with aggregate-cement mix. Provide water pump to system if line water pressure is inadequate.

- C. Wet-Mix Delivery Equipment: Capable of discharging aggregate-cement-water mixture accurately, uniformly, and continuously.

2.9 BATCHING AND MIXING

- A. Dry-Mix Process: Measure mix proportions by weight batching according to ASTM C 94 or by volume batching complying with ASTM C 685 requirements.
 - 1. In volume batching, adjust fine-aggregate volume for bulking. Test fine-aggregate moisture content at least once daily to determine extent of bulking.
 - 2. Pre-packaged shotcrete materials may be used at Contractor's option. Pre-dampen pre-packaged shotcrete materials and mix before use.
- B. Wet-Mix Process: Measure, batch, mix, and deliver shotcrete according to ASTM C 94 and ASTM C 1116 and furnish batch ticket information if ready mix is used.
 - 1. Comply with ASTM C 685 when shotcrete ingredients are delivered dry and proportioned and mixed on-site.
 - 2. Pre-packaged shotcrete materials may be used at Contractor's option.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Comply with Section "Surface Preparation for Patching and Overlay".
- B. Concrete or Masonry: Before applying shotcrete, remove unsound or loose materials and contaminants that may inhibit shotcrete bonding. Chip or scarify areas to be repaired to extent necessary to provide sound substrate. Cut edges square and 1/2 inch (13 mm) deep at perimeter of work, tapering remaining shoulder at 1:1 slope into cavity to eliminate square shoulders. Dampen surfaces before shotcreting.
 - 1. Abrasive blast or hydro-blast existing surfaces that do not require chipping to remove paint, oil, grease, or other contaminants and to provide roughened surface for proper shotcrete bonding.
- C. Steel: Clean steel surfaces by abrasive blasting according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

3.2 FORMS

- A. General: Design, erect, support, brace, and maintain forms, according to ACI 301, to support shotcrete and construction loads and to facilitate shotcreting. Construct forms so shotcrete members and structures are secured to prevent excessive vibration or deflection during shotcreting.

1. Fabricate forms to be readily removable without impact, shock, or damage to shotcrete surfaces and adjacent materials.
 2. Construct forms to required sizes, shapes, lines, and dimensions using ground wires and depth gages to obtain accurate alignment, location, and grades in finished structures. Construct forms to prevent mortar leakage but permit escape of air and rebound during shotcreting. Provide for openings, offsets, blocking, screeds, anchorages, inserts, and other features required in the Work.
- B. Form openings, chases, recesses, bulkheads, keyways, and screeds in formwork. Determine sizes and locations from trades providing such items. Accurately place and securely support items built into forms.

3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that weaken shotcrete bonding.
- C. Securely embed reinforcing anchors into existing substrates, located as required.
- D. Accurately position, support, and rigidly secure reinforcement against displacement by formwork, construction, or shotcreting. Locate and support reinforcement by metal chairs, runners, bolsters, spacers, and hangers, as required.
- E. Place reinforcement to obtain minimum coverages for shotcrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during shotcreting. Set wire ties with ends directed into shotcrete, not toward exposed shotcrete surfaces.
- F. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.4 JOINTS

- A. Construction Joints: Locate and install construction joints tapered to a 1:1 slope where joint is not subject to compression loads and square where joint is perpendicular to main reinforcement. Continue reinforcement through construction joints.
- B. Contraction Joints: Construct contraction joints in shotcrete using saw cuts 1/8-inch- (3-mm-) wide-by-1/3 shotcrete depth or pre-molded plastic, hardboard, or fiberboard strip inserts 1/4-inch- (6-mm-) wide-by-1/3 shotcrete depth, unless otherwise indicated.
 1. After shotcrete has cured, remove strip inserts and clean groove of loose debris.
 2. Confirm joint spacing in field with Engineer.

3. Tool edges round on each side of strip inserts if floated or troweled finishes are required.

3.5 ALIGNMENT CONTROL

- A. Ground Wires: Install ground wires to establish thickness and planes of shotcrete surfaces. Install ground wires at corners and offsets not established by forms. Pull ground wires taut and position adjustment devices to permit additional tightening.

3.6 APPLICATION

- A. Apply temporary protective coverings and protect adjacent surfaces against deposit of rebound and overspray or impact from nozzle stream.
- B. Moisten wood forms immediately before placing shotcrete where form coatings are not used.
- C. Apply shotcrete according to ACI 506.2.
- D. Apply dry-mix shotcrete materials within 45 minutes after pre-dampening and wet-mix shotcrete materials within 90 minutes after batching.
- E. Deposit shotcrete continuously in multiple passes, to required thickness, without cold joints and laminations developing. Place shotcrete with nozzle held perpendicular to receiving surface. Begin shotcreting in corners and recesses.
 1. Remove and dispose of rebound and overspray materials during shotcreting to maintain clean surfaces and to prevent rebound entrapment.
- F. Maintain reinforcement in position during shotcreting. Place shotcrete to completely encase reinforcement and other embedded items. Maintain steel reinforcement free of overspray and prevent build-up against front face during shotcreting.
- G. Do not place subsequent lifts until previous lift of shotcrete is capable of supporting new shotcrete.
- H. Do not permit shotcrete to sag, slough, or dislodge.
- I. Remove hardened overspray, rebound, and laitance from shotcrete surfaces to receive additional layers of shotcrete; dampen surfaces before shotcreting.
- J. Do not disturb shotcrete surfaces before beginning finishing operations.
- K. Remove ground wires or other alignment control devices after shotcrete placement.
- L. Shotcrete Core Grade: Apply shotcrete to achieve mean core grades not exceeding 2.5 according to ACI 506.2, with no single core grade exceeding 3.0.

- M. Installation Tolerances: Place shotcrete without exceeding installation tolerances permitted by ACI 117R, increased by a factor of 2.

3.7 SURFACE FINISHES

- A. Finish Coat: After screeding to natural rod finish, apply shotcrete finish coat, 1/4 to 1 inch (6 to 25 mm) thick, using ACI 506R, No. 1 gradation, fine-screened sand modified with maximum aggregate size not exceeding No. 4 (4.75-mm) sieve and apply steel-trowel, smooth, hard finish.

3.8 CURING

- A. Protect freshly placed shotcrete from premature drying and excessive cold or hot temperatures.
- B. Start initial curing as soon as free water has disappeared from shotcrete surface after placing and finishing.
- C. Curing Exposed Surfaces: Cure shotcrete by the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for at least seven days with water, continuous water-fog spray, water-saturated absorptive covers, or moisture-retaining covers. Lap and seal sides and ends of covers.
 - 2. Curing Compound: Apply curing compound uniformly in continuous operation by power spray according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Curing compound prohibited for surfaces to receive paint, stain, coatings, waterproofing, etc.
 - b. Apply curing compound to natural- or gun-finished shotcrete at rate of 1 gal./100 sq. ft. (1 L/2.5 sq. m).
- D. Curing Formed Surfaces: Cure formed shotcrete surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

3.9 FORM REMOVAL

- A. Forms not supporting weight of shotcrete may be removed after curing at not less than 50 deg F (10 deg C) for 24 consecutive hours after gunning, provided shotcrete is hard enough not to be damaged by form-removal operations and provided curing and protecting operations are maintained.
 - 1. Leave forms supporting weight of shotcrete in place until shotcrete has attained design compressive strength. Determine compressive strength of in-place shotcrete by testing representative field-cured specimens of shotcrete.

2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing materials are unacceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

3.10 FIELD QUALITY CONTROL

- A. Owner may engage a qualified independent testing agency to sample materials, visually grade cores, perform tests, and submit reports during shotcreting.
- B. Air Content: ASTM C 173, volumetric method or ASTM C 231, pressure method; 1 test for each compressive-strength test for each mix of air-entrained, wet-mix shotcrete measured before pumping.
- C. Shotcrete Temperature: ASTM C 1064; 1 test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and 1 test for each set of compressive-strength specimens.
- D. Test Panels: Make a test panel, reinforced as in structure, for each shotcrete mix and for every 50-cu. yd. (38 cu. m) of shotcrete placed. Produce test panels with dimensions of 24 by 24 inches (600 by 600 mm) minimum and of average thickness of shotcrete, but not less than 4-1/2 inches (115 mm). From each test panel, testing agency will obtain six test specimens: one set of three specimens unreinforced and one set of three specimens reinforced.
 1. Test each set of unreinforced specimens for compressive strength according to ASTM C 1140 and construction testing requirements in ACI 506.2.
 2. Visually inspect each set of reinforced shotcrete cores taken from test panels and determine mean core grades according to ACI 506.2.
 3. Approved test panels may be incorporated into final work.
- E. In-Place Shotcrete: Take a set of 3 unreinforced cores for each mix and for every 50-cu. yd. (38 cu. m) of shotcrete placed. Test cores for compressive strength according to ACI 506.2 and ASTM C 42. Do not cut steel reinforcement.
- F. Strength of shotcrete will be considered satisfactory when mean compressive strength of each set of 3 unreinforced cores equals or exceeds 85 percent of specified compressive strength, with no individual core less than 75 percent of specified compressive strength.
 1. Mean compressive strength of each set of 3 unreinforced cubes shall equal or exceed design compressive strength with no individual cube less than 88 percent of specified compressive strength.

3.11 REPAIRS

- A. Remove and replace shotcrete that is delaminated or exhibits laminations, voids, cracks, or sand/rock pockets exceeding limits for specified core grade of shotcrete.
 - 1. Remove unsound or loose materials and contaminants that may inhibit bond of shotcrete repairs. Chip or scarify areas to be repaired to extent necessary to provide sound substrate. Cut edges square and 1/2 inch (13 mm) deep at perimeter of work, tapering remaining shoulder at 1:1 slope into cavity to eliminate square shoulders. Dampen surfaces and apply new shotcrete.
- B. Repair core holes from in-place testing according to repair provisions in ACI 301 and match adjacent finish, texture, and color.

3.12 CLEANING

- A. Remove and dispose of rebound and overspray materials from final shotcrete surfaces and areas not intended for shotcrete placement.

END OF SECTION 033713

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SECTION 033760 – PREPACKAGED REPAIR MORTAR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the provision of all labor, materials, supervision, and incidentals necessary to prepare deteriorated or damaged concrete surfaces and install prepackaged concrete repair mortar to formed horizontal, vertical, and overhead surfaces to restore original surface condition and integrity.

1.3 QUALITY ASSURANCE

- A. Work shall conform to requirements of ACI 301 as applicable except where more stringent requirements are shown on Drawings or specified in this Section.
- B. Testing Agency:
 - 1. Independent testing laboratory employed by Owner and acceptable to Engineer.
 - 2. Accredited by AASHTO under ASTM C1077. Testing laboratory shall submit documented proof of ability to perform required tests.
- C. Sampling and testing of mortar shall be performed by ACI certified Concrete Field Technicians Grade I. Certification shall be no more than three years old.
- D. Testing Agency is responsible for conducting, monitoring, and reporting results of all tests required under this Section. Testing Agency has authority to reject mortar not meeting Specifications. Testing Agency does not have the authority to accept mortar that does not meet specifications.
- E. Testing Agency shall submit the following information for Field Testing of Concrete unless modified in writing by Engineer:
 - 1. Project name and location.
 - 2. Contractor's name.
 - 3. Testing Agency's name, address, and phone number.
 - 4. Mortar manufacturer.
 - 5. Date of report.
 - 6. Testing Agency technician's name (sampling and testing).
 - 7. Placement location within structure.

8. Weather data:
 - a. Air temperatures.
 - b. Weather.
 - c. Wind speed.
9. Date, time, and place of test.
10. Compressive test data:
 - a. Cube or cylinder number.
 - b. Age of sample when tested.
 - c. Date and time of test.
 - d. Compressive strength.

1.4 REFERENCES

- A. "Standard Specification for Structural Concrete" (ACI 301) by American Concrete Institute, herein referred to as ACI 301, is included in total as specification for this structure except as otherwise specified herein.
- B. Comply with provisions of following codes, specifications and standards except where more stringent requirements are shown on Drawings or specified herein:
 1. "Building Code Requirements for Structural Concrete" (ACI 318), American Concrete Institute, herein referred to as ACI 318.
 2. "Hot Weather Concreting" reported by ACI Committee 305.
 3. "Cold Weather Concreting" reported by ACI Committee 306.
 4. "Standard Specification for Curing Concrete" (ACI 308.1)
- C. Contractor shall have following ACI publications at Project construction site at all times:
 1. "Standard Specifications for Structural Concrete (ACI 301) with Selected ACI and ASTM References," ACI Field Reference Manual, SP15.
 2. "Hot Weather Concreting" reported by ACI Committee 305.
 3. "Cold Weather Concreting" reported by ACI Committee 306.
- D. American Society for Testing and Materials (ASTM):
 1. ASTM C109, "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)."
 2. ASTM C31, "Test Method for Compressive Strength of Cylindrical Concrete Specimens."
 3. ASTM C1583, "Standard Test Method for the Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)".

1.5 SUBMITTALS

- A. Make submittals in accordance with requirements of Division 01 and as specified in this Section.
- B. Contractor: At preconstruction meeting, submit procedures for demolition, surface preparation, material batching, placement, finishing, and curing of application. Provide procedure to protect fresh patches from severe weather conditions.
- C. Testing Agency: Promptly report all mortar test results to Engineer and Contractor. Include following information:
 - 1. See Article "Quality Assurance" paragraph "Testing Agency shall submit...."
 - 2. Strength determined in accordance with ASTM C109.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of following, only where specifically named in product category:
 - 1. BASF Building Systems (BASF), Shakopee, MN.
 - 2. Euclid Chemical Corporation (Euclid), Cleveland, OH.
 - 3. King Construction Products (King), Burlington, ON.
 - 4. Mapei Corporation (MAPEI), Deerfield Beach, FL.
 - 5. Sika Corporation (Sika), Lyndhurst, NJ.
 - 6. J.E. Tomes (Tomes), Blue Island, IL.

2.2 MATERIALS

- A. The following listed materials are not acceptable for all types of repair methods and work items (i.e. form and pour, form and pump, horizontal application, overhead application, partial-depth, full-depth, etc.). Contractor to state proposed use for individual products on product submittals for Engineer approval prior to start of work.
- B. If galvanic anodes are accepted by Owner for certain work items, contractor to verify compatibility of repair materials, and/or utilize bedding mortar per anode manufacturer's recommendations.
- C. Horizontal Repair and Form and Pour Mortar: Shall be pre-packaged cementitious repair mortar capable of horizontal and form and pour partial depth applications, achieving a minimum 3,000 psi compressive strength at 7 days and 5,000 psi compressive strength at 28 days per ASTM C39 as certified by manufacturer with maximum lineal shrinkage of 0.10% at 28 days. Extend per manufacturer's instructions as required for deeper placements.

1. Acceptable cementitious repair materials for this Work are as follows:

- a. "MasterEmaco S440," by BASF.
- b. "Eucocrete," by Euclid.
- c. "FA-S10 Concrete," by King.
- d. "Planitop 11," by MAPEI.
- e. "Sikacrete 211," by Sika.
- f. Other types may be used only with Engineer's approval in writing prior to bidding.

1. Acceptable polymer modified materials for this Work are as follows:

- a. "MasterEmaco T310 CI" by BASF.
- b. "Sika Repair 222 with Latex R" or "SikaTop 111 Plus", by
- c. "Duraltop" by Euclid
- d. Form-Flo P-38 by Tomes
- e. Other types may be used only with Engineer/Architect's approval in writing prior to bidding.

- D. Horizontal Repair and Form and Pour Mortar for use with Galvanic Anodes (if accepted): Shall be prepackaged cementitious repair mortar capable of horizontal and form and pour partial depth applications, achieving a minimum 3,000 psi compressive strength at 7 days and 5,000 psi compressive strength at 28 days per ASTM C39 as certified by manufacturer with maximum lineal shrinkage of 0.10% at 28 days. Manufacturer shall provide written certification of compatibility with galvanic anode corrosion protection system. Extend per manufacturer's instructions as required for deeper placements.

1. Acceptable materials for this Work are as follows:

- a. "MasterEmaco S440," by BASF.
- b. "EucoRepair CP," by Euclid.
- c. "FA-S10 Concrete," by King.
- d. "Sikacrete 211," by Sika.
- e. "Form Flo P-38," by Tomes.
- f. Other types may be used only with Engineer's approval in writing prior to bidding.

- E. Rapid Strength Repair Mortar: Shall be prepackaged, cementitious repair mortar. Repair mortar shall be capable of application achieving a minimum 3,500 psi compressive strength at 1 day and 5,000 psi compressive strength at 28 days per ASTM C39 as certified by manufacturer. Extend per manufacturer's instructions as required for deeper placements.

1. Acceptable materials for this Work are as follows:

- a. "MasterEmaco T430," by BASF.
- b. "Speedcrete 2028," by Euclid.
- c. "HP-S10 Concrete," by King.
- d. "Planitop 18 ES" by MAPEI.

- e. "Sikaquick 1000," by Sika.
 - f. "Aprisa P-80," by Tomes.
 - g. Other types may be used only with Engineer's approval in writing prior to bidding.
- F. Trowel Applied Repair Mortar: Shall be prepackaged, cementitious repair mortar capable of vertical/overhead application by trowel achieving a minimum 3,000 psi compressive strength at 7 days and 4,500 psi compressive strength at 28 days per ASTM C 109 as certified by manufacturer.
- 1. Trowel-applied repair mortars only allowed for shallow repairs 2 S.F. in size or less. Confirm with Engineer prior to start of Work.
 - 2. Acceptable materials for this Work are as follows:
 - a. "MasterEmaco N425," by BASF.
 - b. "Verticoat Supreme," by Euclid.
 - c. "Super-Top," by King.
 - d. "Planitop XS," by MAPEI
 - e. "Sikaquick VOH," by Sika.
 - f. "CT-40 Do All Mortar," by Tomes.
 - g. Other types may be used only with Engineer's approval in writing prior to bidding.
 - 3. Acceptable polymer modified materials for this Work are as follows:
 - a. "MasterEmaco N 400 RS," "MasterEmaco N 400," "MasterEmaco N 426," or "MasterEmaco N 300 CI" by.
 - b. "Verticoat," "Speedcrete PM," or "Duraltop Gel" by The Euclid.
 - c. "SikaRepair 223 with Latex R", "SikaRepair SHB with Latex R", or "SikaRepair SHA with Latex R," by.
 - d. "Super-Top OV" by King
 - e. Other types may be used only with Engineer's approval in writing prior to bidding.
- G. Horizontal Topping Mortar: Shall be prepackaged cementitious repair mortar capable of horizontal partial depth applications on minimum thickness of 0.5 inches and a maximum thickness of 2 inches, achieving a minimum 3,000 psi compressive strength at 7 days and 5,000 psi compressive strength at 28 days per ASTM C109 as certified by manufacturer. The mortar is not to be extended.
- 1. Acceptable materials for this Work are as follows:
 - a. "MasterEmaco T1061," by BASF.
 - b. "Concrete Top Supreme," by Euclid.
 - c. "Duro-crete," by King.
 - d. "Planitop 15," by MAPEI.
 - e. "SikaTop 111 Plus," by Sika.
 - f. "CT-40 Do All Mortar," by Tomes.

- g. Other types may be used only with Engineer's approval in writing prior to bidding.

2.3 MATERIAL ACCESSORIES

- A. Extended Open Time Epoxy Bonding Agent: Three component, water based, epoxy modified portland cement bonding agent and corrosion inhibitor coating providing the recommended Manufacturer's open time in which to apply repair mortar.
- B. Confirm compatibility with galvanic anodes (if accepted).
 - 1. Acceptable materials for this Work are:
 - a. "MasterEmaco P124," by BASF.
 - b. "Duralprep A.C.," by Euclid.
 - c. "Planibond 3C," by MAPEI.
 - d. "Armotec 110 EpoCem", by Sika.
 - e. "B-1 Rebar Coating," by Tones.
- C. Bonding Grout: Bonding grout shall consist of prepackaged repair material mixed with sufficient water to form stiff slurry to achieve consistency of "pancake batter".
- D. Clear, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
 - 1. Prohibited on surfaces to receive paints, stains, coatings, etc. Confirm with Engineer prior to use.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Contractor shall utilize bonding agent or bonding grout at all repair areas as described below:
- B. Epoxy Bonding Agent Extended Open Time:
 - 1. In strict accordance with manufacturer's recommendations, mix and apply epoxy bonding agent to all concrete surfaces to receive repair material.
 - 2. Allow epoxy bonding agent to dry a minimum 2 hours, but no more than the Manufacturer's recommended open time prior to placing repair material.
- C. Bonding Grout:
 - 1. Mix bonding grout and scrub into SSD repair substrate with a stiff broom to all areas as indicated on Drawings.

2. Place repair material prior to initial set of grout. If grout sets prior to placement of repair material, completely remove grout from surface and re-clean prior to proceeding with new grout placement and repair mortar.
- D. Mortar Placement: Mortar materials shall be placed in strict accordance with manufacturer's instructions. Properly proportioned and mixed mortar material shall be placed using tools to consolidate mortar so that no voids exist within new material and continuous contact with base concrete is achieved.
- E. Form and Pour Repair Mortar Placement: Mix and apply in strict accordance with manufacturer's written instructions, to achieve a maximum 9" slump. Consolidate mortar so that no voids exist and continuous contact with base concrete is achieved.
- F. Vertical and Overhead Repairs: Mortar materials shall be placed in strict accordance with manufacturer's instructions. Properly proportioned and mixed mortar material shall be placed using tools to consolidate mortar so that no voids exist within new material and continuous contact with base concrete is achieved. Supplemental wire mesh shall be required for delamination and spall repairs greater than two inches in depth. **Fresh bonding grout/bonding agent is required between successive lifts of patching material, if recommended by manufacturer.**
- G. Finishing:
 1. Apply a non-slip broom finish to top of floor patches and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
 2. Provide a surface finish similar to adjacent surfaces for vertical and overhead partial depth repairs.
 3. Finish formed surfaces similar to adjacent surfaces.

3.2 CONCRETE PROTECTION AND CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305R for hot-weather protection during placement. Keep concrete continually moist prior to final curing by evaporation retarder, misting, sprinkling, or using absorptive mat or fabric covering kept continually moist.
- B. Immediate upon conclusion of finishing operation cure concrete in accordance with ACI 308.1 for duration of at least seven days by curing methods listed below. Provide additional curing immediately following initial curing and before concrete has dried.
 1. During initial and final curing periods maintain concrete above 50°.
 2. Prevent rapid drying at end of curing period.
- C. Concrete surfaces to receive paints, stains, coatings, sealers, etc. shall be cured with moisture curing or moisture-retaining-cover curing.

- D. Curing Methods: Cure formed and non-formed concrete moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 3. Curing compound: Apply curing compound in accordance with manufacturer's instructions.
 - a. Prohibited for concrete surfaces to receive paints, stains, coatings, sealers, etc. Curing shall be with moisture curing or moisture-retaining-cover curing.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner shall engage a qualified independent testing and inspecting agency acceptable to the Engineer to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article. Perform tests according to ACI 301.
- B. Testing Frequency: Perform one set of strength testing and one bond test for each product used for each day's work. Prepare samples in accordance with ASTM C31.
- C. Compressive Strength Testing: Determine strength at 7 and 28 days. Each test shall consist of two 6-inch diameter cylinders or three 4-inch diameter cylinders. Testing shall be in accordance with ASTM C39.
- D. Compressive Strength Testing: Determine strength at 7 and 28 days. Each test shall consist of three 2-inch cubes. Testing shall be in accordance with ASTM C109 using as placed mortar.
- E. Bond Testing (if applicable): Bond testing shall be performed at 7 days in accordance with ASTM C1583.

3.4 EVALUATION AND ACCEPTANCE OF WORK

A. Acceptance of Repairs (ACI 301):

1. Acceptance of completed concrete Work will be according to provisions of ACI 301.
2. Repair areas shall be sounded by Engineer and Contractor with hammer or rod after curing for 72 hours. Contractor shall repair all hollowness detected by removing and replacing patch or affected area at no extra cost to Owner.
3. If shrinkage cracks appear in repair area when initial curing period is completed, repair shall be considered defective, and it shall be removed and replaced by Contractor at no extra cost.
4. Patches shall be considered defective if average strength does not meet minimum strength at 28 days or if average bond strength does not meet minimum requirements of 150 psi.

END OF SECTION 033760

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SECTION 033818 - UNBONDED POST-TENSIONING REPAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. In accordance with Contract Documents, provide all materials, labor, equipment, and supervision to fabricate and install all post-tensioning repair Work. Non-prestressed reinforcement shall conform to Division 03 Section "Cast-in-Place Concrete".
- B. Meet the requirements of ACI 301, ACI 318, ACI 423.7, CRSI MSP-2, and Contract Documents. In case of a conflict, meet the more stringent requirement.

1.3 REFERENCES

- A. Field Reference: Keep a copy of the following reference in the Contractor's field office.
 - 1. PTI's "Field Procedures Manual for Unbonded Single Strand Tendons".
- B. American Concrete Institute (ACI):
 - 1. ACI 301, "Specification for Structural Concrete."
 - 2. ACI 318, "Building Code Requirements for Structural Concrete."
 - 3. ACI 347, "Recommended Practice for Concrete Formwork."
 - 4. ACI 362.1R-97, "Guide for the Design of Durable Parking Structures."
 - 5. ACI 423.3R, "Recommendations for Concrete Members Prestressed with Unbonded Tendons."
 - 6. ACI 423.7, "Specification for Unbonded Single-Strand Tendon Materials and Commentary."
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM A416, "Specification for Uncoated Seven-Wire Strand for Prestressed Concrete."
 - 2. ASTM A421, "Standard Specification for Uncoated Stress-Relieved Steel Wire for Prestressed Concrete."
 - 3. ASTM E328, "Recommended Practice for Stress-Relaxation Tests for Materials and Structures."

- D. Concrete Reinforcing Steel Institute (CRSI):
 - 1. CRSI MSP-2, "Manual of Standard Practice."
- E. Post-Tensioning Institute (PTI):
 - 1. PTI, "Guide Specifications for Post-Tensioning Materials."
 - 2. PTI, "Performance Specification for Corrosion Preventive Coating."
 - 3. PTI, "Specification for Unbonded Single Strand Tendons."
 - 4. PTI, "Field Procedures Manual for Unbonded Single Strand Tendons."
 - 5. PTI, "Guide for evaluation and Repair of Unbonded Post-Tensioned Concrete Structures."
- F. International Code Conference (ICC):
 - 1. ICC, "International Existing Building Code."
 - 2. ICC, "International Existing Building Code Standards."

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the tendon and anchor locations with Work of other Sections, including "Cast-in-Place Concrete." Immediately inform Engineer/Architect of any potential interference.
- B. Sequencing:
 - 1. Deviations in the construction and stressing sequence shown on the Drawings are not permitted without written acceptance from Engineer/Architect.
- C. Make submittals in accordance with requirements of Division 01 Sections.
- D. Submittals and Resubmittals:
 - 1. Engineer will review each submittal the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made.
 - 2. Circle resubmittal changes/revisions/corrections. Engineer will review only circled items and will not be responsible for non-circled changes, revisions, corrections, or additions.
 - 3. Should additional resubmittals be required, reimburse Owner for all costs incurred, including the cost of Engineer's services made necessary to review such additional resubmittals. Owner will in turn reimburse Engineer.
- E. Requests For Information
 - 1. Engineer reserves the right to reject, unprocessed, any Request for Information (RFI) that the Engineer, at its sole discretion, deems frivolous.

2. Engineer reserves the right to reject, unprocessed, any RFI that the Engineer, at its sole discretion, deems already answered in the Contract Documents.
3. Do not use RFI process to request substitutions. Procedures for substitutions are clearly specified elsewhere in the contract documents.

1.5 ACTION SUBMITTALS

- A. Product Data: For each product as indicated.
 1. Corrosion Inhibiting Coating: Type and chemical analysis.
 2. Sheathing: Type, material, density, and thickness.
 3. Anchorage Device: Type, material, and size.
 4. Coupler Device: Type, material, and size.
 5. Intermediate Stressing Coupler Device: Type, material, and size.
 6. Pocket Former: Type, material, and size.
 7. Sheathing Repair Tape: Type, material, and width.
 8. Encapsulation System: Type and materials.
- B. Shop Drawings: Include the following prepared by or under the supervision of a qualified professional engineer, if requested by Engineer:
 1. Number, arrangement, and designation of tendons.
 2. Tendon profile and method of tendon support. Show tendon profiles at sufficient scale to clearly indicate tendon high and low points.
 3. Tendon anchorage details including bundled tendon flaring.
- C. Samples: For the following products:
 1. Encapsulation system.
- D. Delegated-Design: For post-tensioning system.
 1. Signed and sealed calculations prepared by a qualified structural engineer indicating method of elongation. Include values used for friction coefficients, anchorage seating loss, elastic shortening, creep, relaxation, wobble and shrinkage.
- E. Stressing Records: Same day as stressing operation.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Supplier and Installer using the forms at the end of this section.
- B. Mill Test Reports: Certified mill test reports for each coil or pack of strand used on Project, indicating that strand is low relaxation and including the following information:
 1. Heat number and identification.
 2. Minimum breaking strength.

3. Yield strength at 1 percent extension under load.
 4. Elongation at failure.
 5. Modulus of elasticity.
 6. Diameter and net area of strand.
- C. Test and Evaluation Reports: Indicating compliance with the following requirements:
1. Tests required by ACI 301, Section "Post-Tensioned Concrete."
 2. Relaxation loss tests required by ACI 423.7 for low relaxation prestressing steel.
- D. Field Quality-Control Reports: Within 72 hours of inspection.
- E. Stressing Jack Calibration: Calibration certificates for jacks and gages to be used on Project. Calibrate each jack-and-gage set as a pair.
- F. Warranty: Proposed warranty prior to the start of construction.

1.7 QUALITY ASSURANCE

- A. Supplier Qualifications:
1. Use a fabricating plant certified by PTI.
 2. Successfully provided all materials for at least 5 post-tensioning repair projects in parking structures in the United States with a structural system similar to Project within the previous 5 years. Provide all information requested on the form at the end of this section.
- B. Installer Qualifications:
1. Certified by PTI.
 2. Successfully performed at least 5 post-tensioning repair projects in parking structures in the United States with a structural system similar to Project within the previous 5 years. Provide all information requested on the form at the end of this section.
 3. Use a full-time Project Superintendent that has supervised at least 5 projects of similar magnitude.
 4. Use a full-time onsite Project Foreman that is PTI Certified and has successfully completed at least 5 projects of similar magnitude.
 5. Use PTI Certified Field Installers to install and stress post-tensioning system.
- C. Engineer/Architect will accept, tentatively accept, or reject Supplier or Installer based on compliance with criteria referenced in this section. Following a qualifications check, tentatively accepted Suppliers will be notified of acceptance or rejection before project is awarded.
- D. Suppliers who do not meet the qualification requirements above shall be rejected.
- E. Comply with requirements in ACI 301, Section "Post-Tensioned Concrete."

- F. Perform all post-tensioning Work under the supervision of a fulltime onsite Project Foreman / Superintendent who is present during all operations including, but not limited to:
 - 1. Stressing (and de-tensioning) operations.
 - 2. Concrete removals.
 - 3. Installation of P/T hardware.
 - 4. Concrete placement and finishing.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Assign all tendons in same member the same heat number and identify accordingly.
- B. Package each tendon bundle at source to prevent physical damage to tendon during transportation and storage, and to protect strand from moisture. Use heavy padding; cardboard is not permitted. Do not use wire binding or other materials that could cut the sheathing or tendon.
- C. Deliver, store, and handle post-tensioning materials according to ACI 423.7.
- D. Immediately remove damaged components from Project site and replace at no cost to Owner.
- E. Do not remove sheathing on stressing end until the day of stressing.
- F. Materials Stored on Slabs:
 - 1. Prior to final stressing of beams and slabs, do not store any materials on slab.
 - 2. After final stressing of beams and slabs but before concrete has reached the specified 28 day strength, do not store materials on slab such that the weight exceeds 50 percent of the design live load.
 - 3. After final stressing and after concrete has reached the specified 28-day strength, do not store materials on slab such that the weight exceeds the design live load.
 - 4. Provide and maintain temporary shoring as needed to support construction loads (incidental).

1.9 WARRANTY

- A. The Contractor shall guarantee against any and all defects in workmanship and materials for newly installed tendon strands, splices, anchorages, and anchoring hardware for a period of 5 years.
- B. The Manufacturer shall guarantee against any and all defects in materials for newly installed tendon strands, splices, anchorages, and anchoring hardware for a period of 5 years.

- C. Written warranty, signed by Contractor/Manufacturer, including:
1. Repair or replacement of post-tensioning tendon repairs installed by Contractor:
 - a. That do not comply with requirements.
 - b. With corroded or fractured prestressing steel or corroded post-tensioning accessories in repair area.
 - c. With corroded or fractured prestressing steel or corroded post-tensioning accessories in areas away from repair, which are directly due to post-tensioning repairs installed by Contractor.
 2. Removal and patching of concrete necessary to remedy distress of post-tensioning repairs covered by warranty.
 3. Repair or replacement, to satisfaction of Owner, of other work or items which may have been displaced or damaged as consequence of defective work.
 4. Make immediate emergency repairs within 24 hours of notice of defective post-tensioning repairs.
 5. Owner will reimburse Contractor for reasonable costs if post-tensioning distress is not due to Work performed by Contractor.
 6. Warranty Period: 5 years after Substantial Completion date.

PART 2 - PRODUCTS

2.1 POST-TENSIONING SYSTEM CRITERIA

- A. Post-tensioning repair anchorage and hardware described in this Section intended to satisfactorily perform in ACI 362.1R-97 zone III environment without long-term corrosion or other distress.
1. PT repairs are to be based on the following: Do not exceed the maximum tensile stress in the tendon during the stressing operation. The maximum tensile stress is 74 percent of the specified tensile strength of the tendon.
 2. Do not exceed 64 percent of the specified tensile strength after the anchors are seated.

2.2 PRESTRESSING TENDONS

- A. Prestressing Strand: ASTM A416, Grade 270, uncoated, seven-wire, low-relaxation strand with minimum ultimate strength of 270 ksi.
1. Manufactured by a single source.
 2. Strands manufactured outside United States subject to Engineer/Architect's approval based on evidence of satisfactory performance in the United States during the previous 5 years.
 3. Use of high stress bar system instead of strand system is not permitted unless accepted in writing by the Engineer.

4. Conform to ACI 423.7 for relaxation loss requirements.
- B. Tendon Sheathing: Seamless and extruded high density polypropylene or seamless and extruded high density polyethylene with a specific gravity greater than 0.95 conforming to ACI 423.7.
1. Sufficient strength to withstand damage during fabrication, transport, installation, concrete placement, and stressing.
 2. Minimum thickness of 50 mils (-0 mils +15 mils).
 3. Minimum inside diameter 0.03 inches greater than maximum strand diameter.
 4. Chemically stable without becoming brittle or softening over anticipated temperature range and service life of structure.
 5. Non-reactive with concrete, steel, and corrosion-inhibiting coating.
 6. Contrasting color of corrosion inhibiting coating to enhance visibility of damage. Black/dark colored sheathing is not acceptable.
 7. Annular space between sheathing and strand completely filled with corrosion-inhibiting coating.
 8. Watertight, including all connections and components over entire length.
- C. Tendon Anchor: Non-porous casting free of sand, blow holes, voids, and other defects meeting the testing and material requirements of ACI 423.7.
1. Plastic-coated bearing plates sized in accordance with ACI 423.7, unless certified test reports substantiate comparable or superior performance, for transfer at minimum stressing concrete strength.
 2. Capable of complying with PTI Guide Specification requirements for aggressive environments.
 3. Capable of developing at least 95% of the actual ultimate strength of tendon.
 4. Minimum wedge cavity opening of at least 0.19 inches larger than tendon diameter. Reaming of anchor wedge cavity is not permitted.
 5. Wedges capable of precluding failure of tendon due to notching or pinching effects during static and fatigue load tests stipulated in ACI 423.7.
 6. Provisions for a plastic cap which fits tightly and seals barrel end on stressing side of anchor.
 7. Provisions for a plastic sleeve which prevents moisture infiltration into anchor casting or tendon sheathing on bearing side of anchor.
- D. Coupler Assembly: Assembly of strands and wedges meeting the testing and material requirements of ACI 301.
1. Capable of complying with PTI Guide Specification requirements for aggressive environments.
 2. Capable of developing at least 95 percent of the ultimate strength of tendon.
 3. Wedges capable of precluding failure of tendon due to notching or pinching effects during static and fatigue load tests stipulated in ACI 423.7.

- E. Encapsulation System for New Prestressing Steel: Watertight encapsulation along the entire length of new tendon, including new anchorages and new couplers, when subjected to hydrostatic testing required in ACI 423.7 for aggressive environments.
1. Sleeve: Translucent plastic with a positive mechanical connection to anchorages capable of resisting 100 lbs. pulling force. Minimum 10 inches long and 4 inches overlap with sheathing, completely filled with corrosion inhibiting coating.
 2. Anchor Cap: Translucent plastic with a positive mechanical connection to anchorages capable of resisting 100 lbs. pulling force. At intermediate anchorages, open to allow passage of strand.
 3. Subject to the requirements provide one of the following systems:
 - a. "Zero Void," General Technologies, Inc.
 - b. "Hayes Posi-Lock Plus," Hayes Industries, Ltd.
 - c. Engineer-accepted equivalent.

2.3 ACCESSORIES

- A. Pocket Formers: Capable of completely sealing wedge cavity from intrusion of concrete or cement slurry; sized to provide at least a 2 inch recess and allow access for cutting strand tail.
1. If Zero Void encapsulation system is used, the "Zero Void Nail-Less Pocket Former" is required.
- B. Anchorage Fasteners: Stainless-steel ring nails. Subject to the requirements use one of the following:
1. Clendenin Brothers, Baltimore, MD.
 2. Swan Secure Products, Baltimore, MD.
 3. R.J. Leahy Co., San Francisco, CA.
 4. Engineer-accepted equivalent.
- C. Sheathing for Repair at Existing Pre-stressing Steel:
1. Watertight, chemically-stable, and non-reactive with prestressing steel, corrosion inhibiting PT coating, and reinforcing steel.
 2. Color shall contrast with PT coating so that sheathing tears will be readily visible.
 3. Polypropylene or polyethylene tubing:
 - a. Minimum thickness of 0.050 inches.
 - b. Inside diameter at least 0.030 inches greater than prestressing steel diameter.
 - c. Slit tubing longitudinally for sheathing repairs at continuous pre-stressing steel.

- D. Sheathing at New Intermediate Anchorage and Couplers:
1. Heat-shrink tubing to encapsulate couplers and splicing hardware at intermediate stressing locations.
 2. Heat shrink tubing shall be: Watertight, chemically-stable, and non-reactive with prestressing steel, corrosion-inhibiting PT coating, and reinforcing steel.
- E. Protection at New End and Intermediate Anchorages:
1. Epoxy coating field-applied to all surfaces of wires, plates, anchor washers, etc. at locations of end and intermediate anchorages and center stressing splices.
- F. Sheathing Repair Tape: Elastic, self-adhesive, moisture-proof tape with a minimum width of 2 inches in contrasting color to tendon sheathing, and that is non-reactive with sheathing, corrosion inhibiting coating, or tendon. Subject to the requirements use one of the following:
1. "3M Tape No. 226," 3M, St. Paul, MN.
 2. "Polyken 826," Berry Plastics Corp, Evansville, IN.
 3. "Tyco Adhesives No. 398," Tyco Adhesives, Franklin, MA.
- G. Sheathing Repair Material: For nicks and cuts less than 0.25 inches use one of the following:
1. "Scotch-Weld DP-8005," by 3M.
- H. Corrosion-inhibiting Coating: Capable of meeting the requirements of ACI 423.7. Subject to the requirements use one of the following
1. "Greasrex K-218," ExxonMobil Oil Corp., Irving, TX.
 2. "Red-i PT Coating Grease," Lubricating Specialties Co., Pico Rivera, CA
 3. "Renolit PTG," Fuch's Lubricant Co., Harvey, IL
 4. "Royal PT-1 and PT-2 Corrosion Inhibiting Grease," Troco Oil Co., Tulsa, OK
- I. Tendon Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening tendons in place. Use tendon supports capable of meeting the requirements in CRSI's "Manual of Standard Practice" and as follows:
1. Clearly marked to differentiate by height.
 2. Capable of resisting overturning during construction operations.
 3. Minimal contact with forms where concrete is exposed to view.
 4. Do not cause voids or damage to surrounding concrete.
 5. All-plastic supports conforming to CRSI Class 1 protection requirements and with a compressive strength higher than concrete.
 6. Acceptable manufacturers:
 - a. Aztec Concrete Accessories, Inc.
 - b. General Technologies, Inc.
 - c. Engineer-accepted equivalent.

2.4 GROUT MATERIALS

- A. Premixed, nonmetallic, noncorrosive, non-staining grout product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with ASTM C 1107, Grade B, with fluid consistency and a 30-minute working time.
- B. Non-reactive with prestressing strand, anchorage materials, or concrete, and without chlorides or other chemicals known to be deleterious to prestressing strand.
- C. Subject to compliance with requirements, provide one of the following:
 - 1. Sure Grip Grout, Dayton Superior.
 - 2. Euco N.S., Euclid Chemical Co.
 - 3. Masterflow 928, BASF.

2.5 EQUIPMENT

- A. Stressing Equipment: Hydraulic jacks with calibrated pressure gauges, capable of gripping prestressing steel and stressing prestressing steel to specified level. Maintain equipment in safe, working condition.
 - 1. Provide certified pressure gauges with means to cross check accuracy constantly. Second gauges are recommended for larger projects.
 - 2. Provide at Site current, not to exceed 6 months, calibration chart for each jack relating gauge pressure to jacking force.
 - 3. Exercise care in handling of stressing equipment.
- B. Necessary equipment to detension, cut, and splice prestressing strands.
- C. Calibration of hydraulic equipment and gauges.
- D. The Contractor shall provide the equipment, and use appropriate methods to expose the embedded post-tensioning sheathing. The demolition to expose embedded post-tensioning sheathing shall not compromise the structural integrity of the slab and shall minimize damage to the tendon sheathing. The following equipment, or an Engineer-approved equal, may be used on this project.
 - 1. Chipping hammers of nominal 15-lb. class or less for removal of concrete to expose tendon sheathing.
 - 2. Compressed air equipment capable of removing dust and dirt from concrete repair areas. Comply with OSHA Crystalline Silica Requirements.
- E. All equipment is to be operated and maintained according to the manufacturer's recommendations or the approved testing procedures.
- F. Operation of stressing equipment shall be performed by tradesman experienced in this work with a PTI level 1 Unbonded – Field Installation certification.

PART 3 - EXECUTION

3.1 PRECAUTIONS

- A. Prestressing steel under stress has significant stored energy. Exercise 1 care in detensioning and stressing.
 - 1. Erect and maintain work platforms in safe condition, in conformance with Government regulations.
 - 2. Protect areas around, adjacent to, and below work area, including vehicular traffic, from damage.
 - 3. Protect construction personnel and passersby from injury.
 - a. Do not allow anyone to stand in front of, behind, over, or beneath hydraulic jack, or anywhere along the tendon during stressing or prestressing steel to be detensioned.
 - b. After stressing, when releasing jack pressure to transfer force to wedges, laborers' fingers shall be kept clear of assembly.
- B. Close off area around, adjacent to, and below work area or use canopies and barriers as necessary to protect public.
- C. Detensioning shall be performed by cutting, preferably while tendon is still embedded in concrete, by use of specialty detensioning equipment, or by other approved means.

3.2 PREPARATION

- A. Prior to concrete removal, locate prestressing steel using non-destructive testing (NDT) methods at locations along the length of each tendon in each bay, or by other approved means.
- B. Identify and clearly mark fractured, corroded, or otherwise damaged sections of prestressing steel. Create exploratory openings in concrete as necessary to locate fractured or corroded sections. Engineer will inspect tendon and determine appropriate repair method before replacement. Tendons with fractured or severely corroded wires shall be repaired by splicing in sections of new tendons similar in kind and size (or replaced for its entire length), and restressing of tendons.
- C. Where significant concrete removal is required or a significant number of tendons require spliced repair and restressing, install shoring and/or sequence repairs as directed by Engineer. This shoring must be designed by an Engineer competent in shoring design.
- D. Remove unsound concrete as specified in Section "Surface Preparation for Patching and Overlay" and as approved by Engineer. Exercise care to avoid damaging prestressing steel, sheathings, anchorages, and remaining sound concrete. Do not remove concrete at post-tensioning anchorage(s) unless tendon(s) have been confirmed to be properly de-tensioned.

- E. Maintain tendon profile. Use grout or other means as necessary to securely maintain tendon position during Work.
- F. Identify damaged sheathing and document locations.

3.3 SHEATHING REPAIR

- A. At locations of damaged sheathing, remove concrete to expose sheathing at least 4 inches beyond damaged portion and to create space between the sheathing and the concrete. Exercise care to avoid further damage to sheathing. Concrete removal beneath a stressed tendon shall be minimized where the profile of the tendon may be affected.
- B. At small localized areas of sheathing damage, as determined by Engineer (Note: Items 1 through 4 below are the repair procedure for isolated punctures, holes, and slits where sheathing is mostly intact with minimal damage):
 - 1. Remove rough portions of existing sheathing at damaged area.
 - 2. Fill sheathing with corrosion-inhibiting PT coating.
 - 3. Clean and prepare surface of existing sheathing per tape manufacturer's recommendations. Outer surface of sheathing shall be dry and free of corrosion-inhibiting PT coating.
 - 4. Tape damaged area of sheathing. Wrap tape spirally around sheathing to provide at least layers of tape at all locations. Extend tape at least 2 inches beyond damaged area.
- C. Remove damaged portion of sheathing.
- D. Lightly sandblast exposed prestressing steel to remove rust. Protect existing sheathing from damage (at least a minimum of 4 in. of existing sheathing should be protected at each end of the exposed portion of the sheathing within a repair opening).
- E. Coat exposed prestressing steel or pressure-inject with corrosion-inhibiting PT coating. PT coating must extend to, but not cover, 4 in. of intact existing sheathing at ends of the exposed portion of sheathing.
- F. Clean and prepare the existing sheathing per tape manufacturer's recommendations. At a minimum, the surface of the sheathing shall be dry, clean, and free of corrosion-inhibiting PT coating.
- G. Install new slit tube sheathing (For sheathing repairs where slit tube sheathing does not completely cover the strand, use waterproof tape in place of split sheathing).
 - 1. Place slit tubing around prestressing strand. Position slit on side of prestressing steel, with shingle overlap (i.e., with upper portion overlapping lower portion).
 - 2. Extend new sheathing at least 2 inches over existing sheathing.
 - 3. Tape new sheathing. Wrap tape spirally around sheathing to provide at least 2 layers of tape. Extend tape at least 2 inches onto existing sheathing.

- H. Install new wrapped sheathing (For sheathing repairs where slit tube sheathing of sufficient width to be placed around the entire circumference of the prestressing strand/wires is not available).
 - 1. Wrap polyethylene sheeting around prestressing strand/wires, continuing around the prestressing steel at least three times to provide 3 layers of sheeting at all locations.
 - 2. Position edge of sheeting on side of prestressing steel, with shingle overlap (i.e., with upper portion overlapping lower portion).
 - 3. Extend new sheeting at least 2 inches over existing sheathing.
 - 4. Wrap specialty sheathing tape spirally around sheathing to provide at least 2 layers of tape at all locations. Extend tape at least 2 inches onto existing sheathing.
- I. Sheathing at couplers, central stressing splices (for 7-wire strand tendons), shall consist of heat shrink tubing. Place heat-shrink tubing over coupler, central stressing splice, or tendon during assembly of spliced tendon repair. Do not heat shrink tubing into final position until stressing is completed. Shrink tubing using a heat gun as approved by the Engineer, open flames shall not be permitted. Provide 2 in. minimum overlap with sheathing for adjacent section of tendon.
- J. Protection of Anchorages (and Center Stressing Splices):
 - 1. All new end anchor castings shall be supplied fully encased in 1 protective plastic cover, with plastic trumpet and plastic-covered encapsulation cap, to provide for full encapsulation of the new anchor.
- K. Sheathing repairs shall be watertight.

3.4 SPLICING PRESTRESSING STEEL

- A. Scope:
 - 1. Repair tendons with broken or severely corroded wires at the locations determined by the Engineer by splicing in sections of new strands/tendons similar in kind, tensile strength, and size.
 - 2. Restress the spliced tendons to obtain their design long-term effective post-tensioning force, $0.64 P_u$ (or other force determined by the Engineer after seating losses. Typically, to obtain 64% of specified tensile strength in tendon after the anchors are seated, the jacking force should not exceed 74% of the specified tensile strength of the strand.)
- B. Detension prestressing steel as necessary by cutting, preferably while still embedded in concrete, or by the use of specialty detensioning equipment or by other approved means. Where detensioning of only a portion of the tendon length is desired, install lock-off anchor at location confirmed by Engineer.
- C. Remove concrete as required to expose sufficient length of prestressing steel that is not deteriorated, on both sides of deteriorated strand section, and to permit installation of splice hardware allowing adequate room for movement of the splice during elongation of

the prestressing steel. Exercise care to avoid damaging remaining sound concrete and sheathing.

- D. If prestressing steel drapes into or across the area of concrete removal, discuss method of removing prestressing steel with Engineer. Maintain the design tendon profile.
- E. Remove deteriorated section of prestressing steel.
- F. Discuss splicing procedure with Engineer to ensure that remaining concrete is not overstressed during stressing. It is very important to ensure that the prestressing force gets into the concrete. As a result, it is generally desirable to **limit the size of the tendon repair openings** so that a significant portion of the member cross-section remains available to resist the prestressing force as it is restored to the structure. This is particularly critical at anchorage zones of repaired end anchors, but extent of concrete removal must be considered at all cross-sections along a member being repaired.
- G. Form as necessary and cast concrete repairs that are necessary for stressing prestressing steel. This will include the anchorage zone in front of new tendon end anchors, and may include other locations along the tendon length as appropriate for restoring the member cross-section prior to stressing. Note that prestressing steel will elongate, so repair openings must not be recast prior to stressing in a manner that would inhibit movement of the tendon and its couplers and central stressing splices. A common technique is to leave "boxouts" of sufficient size around couplers and central stressing splices to allow them to move during stressing. Do not stress pre-stressing steel until repair concrete has achieved at least 3,000 psi. Concrete repair areas shall be prepared per Section "Surface Preparation for Patching and Overlay", the exposed pre-stressing steel addressed per Paragraph I below, and the repair opening formed and cast per Section "Cast-in-Place Concrete".
- H. Install splice materials.
 - 1. Pull ends of existing prestressing steel (strand/wires/tendon) taut.
 - 2. Install couplers, new end anchors, and central stressing 1 splices with new section of prestressing strand.
 - 3. New sheathing may need to be placed on the tendon during splicing operations.
- I. Prepare existing prestressing steel.
 - 1. Coat exposed existing prestressing steel with corrosion-inhibiting PT coating.
 - 2. Install slit-tube sheathing over existing pre-stressing steel, and wrap with specialty waterproof tape as described above in Section 3.3.
- J. At locations of couplers and center-stressing splices, use heat shrink tubing to make sheathing continuous across repair opening. Install per Paragraph above.
- K. Stress PT tendon per following requirements and Paragraph 3.6 of this Section.

- L. When stressing operation has been completed and following tendon force verification, prepare repair openings, and form and cast repair openings with concrete.
 - 1. Inspect anchors for correct installation.
 - 2. Inspect sheathing for damage and for continuous seal between sheathing and anchor.
 - a. Repair sheathing damage to watertight condition and correct anchor deficiencies.
 - b. Do not leave tendons and repair area exposed to weather without protection prior to concrete placement. The Contractor shall propose to the Engineer the plan to guarantee a full protection of the PT system to weather aggression.
 - 3. Apply PT coating to exposed prestressing tendons/strands/wires, including strand tails at anchorages, and restore sheathing per Paragraph 3.3.
 - 4. Shrink heat-reactive tubing into position to encapsulate prestressing steel. Seal ends of new sheathing with specialty moisture-proof sheathing tape.
 - 5. Sandblast clean exposed concrete and steel surfaces. Protect tendons from damage.
 - 6. Coat other exposed steel, epoxy, galvanized coating, or approved method.
 - 7. Install dowels into sides of full-depth repair openings as required, anchoring with epoxy.
 - 8. Add supplemental reinforcing as directed by Engineer.
 - 9. Install encapsulation caps over strand tails and secure. Fill stressing anchorage pockets with grout to watertight condition. When grout will be visible, trowel smooth and rub to match adjoining surface.

3.5 EXTRACTION AND THREADING OF NEW POST-TENSIONING STRAND/WIRES

- A. Provide access to tendon to be removed at appropriate locations. (Excavate access openings at high and low points and/or end anchors: Remove external cover; etc.)
- B. Detension post-tensioning strand/wires as necessary by sawcutting, preferably while still embedded in concrete, or specialty detensioning equipment. Provide protection at the end anchorages to prevent anchorage, wedges, or tendon from rebounding during detensioning and causing damage to property or passerby.
- C. Extract existing strand and thread new strand through existing sheathing. If existing strand is wet when exposed, dry sheathing. At the Engineer discretion, clean sheathing with clean rags until two clean passes are achieved. Rags may be saturated with an approved cleaning solvent prior to use. Fill sheathing with new corrosion-inhibiting grease. Thread new strand through existing sheathing.
- D. Install new end anchorages and repair concrete. Provide new wedges and hardware compatible with new end anchor.
- E. Stress new strand per Paragraph 3.6.

- F. Restore access openings at the completion of re-stressing.

3.6 STRESSING PRESTRESSING STEEL

- A. Stressing operations shall be performed by personnel experienced in this Work with a minimum of PTI level 1, or under direct supervision of stressing equipment supplier's representative with a minimum of PTI level 1. Exercise care in handling stressing equipment to maintain accuracy of calibration.
- B. Before stressing, verify that prestressing steel is free-moving along its length. Orient anchorage wedges in the cavity perpendicular to the jack position during stressing.
- C. Stress tendon to provide a final tensile force after seating loss of $0.64 P_u$. Typically, to obtain 64% of specified tensile strength in tendon after the anchors are seated, the jacking force should not exceed 74% of the specified tensile strength of the strand.
 - 1. Calculate elongation for specified tensile stress for each tendon.
 - 2. Sequence stressing as necessary.
 - 3. Monitor hydraulic pressure and convert to jacking force with jack calibration curve.
 - 4. Measure prestressing steel elongation and compare with calculated elongation. If difference is more than 7 percent notify the Engineer for direction. When specified tensile stress has been attained, anchor pre-stressing steel with wedges.
 - 5. If required, perform lift-off test in presence of Engineer after stressing and seating of wedges. As an example, Liftoff testing may be required if the elongations do not meet the 7% as shown above.
 - 6. Maintain stressing records during stressing operations and submit to Engineer.
- D. If turnbuckle-type cable splice is used, stress tendon per the manufacturer's recommendations.
 - 1. Calculate elongation for specified tensile stress for each tendon.
 - 2. Restress tendon using calibrated torque wrench. Stress to designated tensile force using calculated correlation between applied torque and tensile force.
 - 3. Measure prestressing steel elongation at various levels of stressing force and compare with calculated elongation.
 - 4. If measured and calculated elongations differ by more than 7 percent, cease stressing operations until cause of deviation is found and corrected.
 - 5. Record applied torque, determine calculated tensile force, and submit to Engineer for review and approval.
- E. After Engineer has accepted stressing records, prepare repair openings for concrete placement per Paragraph 3.4.L above.
 - 1. Cut off tails of prestressing strand.
 - 2. Clean prestressing steel, anchorages, and concrete pockets of corrosion-inhibiting grease. Use non-corrosive solvent.
 - 3. Cut end of prestressing steel within pocket, providing for at least 3/4 inches of concrete cover at remaining steel.

- a. Do not damage prestressing steel, anchorage, or concrete. Leave prestressing steel end clean and free of burrs.
 - b. Do not cut strands less than ½ inch from wedges.
-
4. Install protective cap on cut ends where possible to prevent moisture infiltration.
 5. Prestressing steel ends shall be accessible for inspection prior to and during cutting, and prior to placement of protective caps and grout.

3.7 FIELD QUALITY CONTROL

- A. Stressing records shall be filled out during retensioning operations, and then be submitted to the Engineer for review and verification, per PTI M-10. The following data shall be recorded as a minimum:
 1. Name of the project.
 2. Tendon number correlated to a plan view identifying tendon locations.
 3. Gauge pressure to achieve required force as per supplied calibration chart.
 4. Calculated elongation, and allowable range of elongations, at design tensile force.
 5. Actual elongation achieved.
 6. Actual gauge pressure at end of stressing.
 7. Date of stressing operation.
 8. Name and signature of the stressing operator or inspector.
 9. Serial or identification number of jacking equipment.
 10. Date of approved shop drawings used for installation and stressing.
- B. Maintain drying records documenting changes in moisture content during drying operations, and submit to Engineer.
- C. Contractor shall inspect tendons after installation. Reject, repair, or replace nonconforming work.
- D. Inspect sheathing for unrepaired damage, for watertight seal between sheathing and anchor, and for correct installation of anchors, before concrete is placed around tendons.
- E. Engineer or testing agency retained by Owner will inspect installed Work prior to concrete placement.

END OF SECTION 033818

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POST-TENSIONING SUPPLIER QUALIFICATION FORM

GENERAL INFORMATION:	
Project:	City:
Supplier:	
General Contractor:	

SAMPLE PROJECT #1	Date Completed:
Project Name:	\$ Value of PT Sub-contract:
City and State:	Tonnage of PT tendons:
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

SAMPLE PROJECT #2	Date Completed:
Project Name:	\$ Value of PT Sub-contract:
City and State:	Tonnage of PT tendons:
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

POST-TENSIONING SUPPLIER QUALIFICATION FORM

SAMPLE PROJECT #3	Date Completed:
Project Name:	\$ Value of PT Sub-contract:
City and State:	Tonnage of PT tendons:
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

SAMPLE PROJECT #4	Date Completed:
Project Name:	\$ Value of PT Sub-contract:
City and State:	Tonnage of PT tendons:
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

POST-TENSIONING SUPPLIER QUALIFICATION FORM

SAMPLE PROJECT #5	Date Completed:
Project Name:	\$ Value of PT Sub-contract:
City and State:	Tonnage of PT tendons:
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

REQUIRED ATTACHMENTS	
	Quality plan for manufacture, delivery, and detailing of post-tensioning system.
	Verification letter stating that the post-tensioning system will be manufactured in a plant with a current PTI certification and that all materials conform with ACI 301, ACI 318, and are approved by the International Code Council (International Building Code.)

POST-TENSIONING INSTALLER QUALIFICATION FORM

GENERAL INFORMATION:	
Project:	City:
Installer:	
General Contractor:	

SAMPLE PROJECT #1	Date Completed:
Project Name:	\$ Value of PT Contract:
City and State:	
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

SAMPLE PROJECT #2	Date Completed:
Project Name:	\$ Value of PT Contract:
City and State:	
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

POST-TENSIONING INSTALLER QUALIFICATION FORM

SAMPLE PROJECT #3	Date Completed:
Project Name:	\$ Value of PT Contract:
City and State:	
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

SAMPLE PROJECT #4	Date Completed:
Project Name:	\$ Value of PT Contract:
City and State:	
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

POST-TENSIONING INSTALLER QUALIFICATION FORM

SAMPLE PROJECT #5	Date Completed:
Project Name:	\$ Value of PT Contract:
City and State:	
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

REQUIRED ATTACHMENTS	
	Resume of Project Superintendent indicating required experience.
	Letter from post-tensioning Supplier accepting Installer.
	Verification letter stating that the Installer has a current PTI certification and that PTI Certified Field Installers will be used to install and stress post-tensioning system.

SECTION 071800 – TRAFFIC COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. A single installer shall be responsible for providing complete waterproofing system, including all products specified in Division 07 Sections.
- B. This Section includes Traffic Coating: Fluid-applied, waterproofing, heavy-duty traffic-bearing, elastomeric membrane with integral wearing surface.
- C. Materials shall be compatible with materials or related Work with which they come into contact, and with materials covered by this Section.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Distribute reviewed submittals to all others whose Work is related.
- B. Pre-installation Conference: Meet at project site well in advance of time scheduled for Work to proceed to review requirements for Work and conditions that could interfere with successful coating performance. Require every party concerned with coating Work, or required to coordinate with it or protect it thereafter, to attend. Include manufacturer's technical representative and warranty officer.
- C. Make submittals in accordance with requirements of Division 01 Sections.
- D. Submittals and Resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal data initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including cost of Engineer's services made necessary to review such additional resubmittals. Owner shall in turn reimburse Engineer.

E. Requests for Information:

1. Engineer reserves right to reject, unprocessed, any Request for Information (RFI) that Engineer, at its sole discretion, deems frivolous and/or deems already answered in the Contract Documents.
2. RFI process shall not be used for requesting substitutions. Procedures for substitutions are clearly specified elsewhere in Contract documents.

1.4 ACTION SUBMITTALS

A. Product Data: For each system indicated, submit the following at least 60 days prior to application.

1. Product description, technical data, appropriate applications, and limitations.
2. Primer type and application rate.
3. Material, and wet mils required to obtain specified dry thickness for each coat.
4. Type, gradation, and aggregate loading required within each coat.

B. Samples:

1. Two 4-in. by 4-in. samples showing finished product of complete coating system to be used as acceptance criteria for coating installation and finished product for entire project. Acceptance criteria that will be considered includes, but is not limited to: surface texture, color, amount of aggregate used, slip-resistance. **Obtain Owner/Engineer's approval of finished product sample prior to start of Work.**
2. Install mockups for approval to match approved samples prior to start of full scale operations.
3. One 4 in. by 4 in. stepped sample showing each component for each system indicated.

C. Sample Warranty: For each system indicated.

1.5 INFORMATION SUBMITTALS

A. Certificates:

1. Certification that products and installation comply with applicable federal, state of Michigan, and local EPA, OSHA, and VOC requirements regarding health and safety hazards.
2. Evidence of applicator's being certified by manufacturer. Evidence shall include complete copy of manufacturer's licensing/certification document, spelling out repair responsibility for warranty claims.
3. Certification from Manufacturer that finishes as specified are acceptable for system to be installed at least 1 month before placement of any concrete which will receive traffic coating.

4. Certification stating static coefficient of friction meets minimum requirements of Americans with Disabilities Act (ADA).
 5. Certification stating materials have been tested and listed for UL 790 Class "A" rated materials/system by UL for traffic coating application specified on project. Containers shall bear UL labels.
 6. Certification from manufacturer confirming compatibility with existing underlying coatings and/or substrate.
- B. Manufacturer's Instructions: For each system indicated.
1. Crack treatment and surface preparation method and acceptance criteria.
 2. Method of application of each coat.
 3. Maximum and minimum allowable times between coats.
 4. Final cure time before resumption of parking and/or paint striping.
 5. Any other special instructions required to ensure proper installation.
- C. Field Quality Control:
1. Quality Control Plan as defined in Part 3.
 2. Two copies each of manufacturer's technical representative's log for each visit.
 3. Testing agency field reports.
- D. Qualification Statements:
1. Manufacturer's qualifications as defined in "Quality Assurance" article.
 2. Installer's qualifications as defined in "Quality Assurance" article.
 3. Signed statement from applicator certifying that applicator has read, understood, and shall comply with all requirements of this Section.

1.6 CLOSEOUT SUBMITTALS

- A. Three copies of System Maintenance Manual.
- B. Five copies of snow removal guidelines for areas covered by Warranty.
- C. Final executed Warranty.

1.7 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Owner retains right to reject any manufacturer.
1. Evidence of acceptable previous work on WALKER-designed projects. If none, so state.
 2. Evidence of financial stability acceptable to Engineer/Architect.
 3. Listing of 20 or more projects completed with submitted system, to include:
 - a. Name and location of project.
 - b. Type of system applied.

- c. On-Site contact with phone number.
- B. Manufacturer's technical representative, acceptable to Engineer/Architect, shall be on site during surface preparation and initial stages of installation.
- C. Installer's Qualifications: Owner retains right to reject any manufacturer.
 - 1. Evidence of compliance with Summary article paragraph "A single installer. . ."
 - 2. Evidence that installer has successfully performed or has qualified staff who have successfully performed at least 5 verifiable years of installations similar to those involved in this Contract, and minimum 10 projects with submitted system.
 - 3. Listing of 5 or more installations in climate and size similar to this Project performed by installer's superintendent.
- D. Testing Agency: Independent testing laboratory employed by Owner and acceptable to Engineer/Architect.
- E. Certifications:
 - 1. Traffic coating shall satisfy current National Volatile Organic Compound (VOC) Emission Standards for Architectural Coatings.
 - 2. Licensing/certification document from manufacturer that confirms system installer is a licensed/certified applicator for the manufacturer and is legally licensed to perform work in the state of Michigan.
 - 3. Licensing/certification agreement shall include following information:
 - a. Applicator's financial responsibility for warranty burden under agreement terms.
 - b. Manufacturer's financial responsibility for warranty burden under agreement terms.
 - c. Process for dispute settlement between manufacturer and applicator in case of system failures where cause is not evident or cannot be assigned.
 - d. Authorized signatures for both Applicator Company and Manufacturer.
 - e. Commencement date of agreement and expiration date (if applicable).

1.8 DELIVERY, STORAGE, 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 preparation.
 - 4. Lot or batch number.
- B. Store materials under cover and protect from weather. Replace packages or materials showing any signs of damage with new material at no additional cost to Owner.

- C. At no time shall weight of stored material being placed on slab area exceed total design load of slab area. Provide temporary shoring as needed to support construction loads (incidental).

1.9 FIELD CONDITIONS

- A. Weather and Substrate Conditions: Proceed with work only when existing and forecast weather and temperature of concrete substrate will permit work in accordance with manufacturer's recommendations.

1.10 WARRANTY

- A. System Manufacturer (**New Application and Complete System Recoating**): Furnish Owner with written total responsibility Joint and Several Warranty, detailing responsibilities of manufacturer and applicator with regard to warranty requirements (Joint and Several). Warranty shall provide that system will be free of defects, water penetration, and chemical damage related to system design, workmanship or material deficiency, consisting of:
 - 1. Any adhesive or cohesive failures.
 - 2. Spalling surfaces.
 - 3. Weathering.
 - 4. Surface crazing (does not apply to traffic coating protection course).
 - 5. Abrasion or tear failure resulting from normal traffic use.
 - 6. Failure to bridge cracks less than 0.0625 in. or cracks existing at time of traffic coating installation on double tees only.
- B. System Manufacturer (**Partial System Recoating**): Furnish Owner with written total responsibility Joint and Several Warranty, detailing responsibilities of manufacturer and applicator with regard to warranty requirements (Joint and Several). Warranty shall provide that system will be free of defects, chemical damage related to system design, workmanship or material deficiency, consisting of:
 - 1. Any adhesive or cohesive failures.
 - 2. Spalling surfaces.
 - 3. Weathering.
 - 4. Surface crazing (does not apply to traffic coating protection course).
 - 5. Abrasion or tear failure resulting from normal traffic use.
- C. If material surface shows any of defects listed above, supply labor and material to repair all defective areas and to repaint all damaged line stripes.
- D. Warranty period shall be a 5-year Joint and Several Warranty commencing with date of acceptance of work.
- E. Perform any repair under this warranty at no cost to Owner.
- F. Address following in terms of Warranty:

1. Length of warranty.
 2. Change in value of warranty – if any – based on length of remaining warranty period.
 3. Transferability of warranty.
 4. Responsibilities of each party.
 5. Notification procedures.
 6. Dispute resolution procedures.
 7. Limitations of liability for direct and consequential damages.
- G. Snowplows, vandalism, studded snow tires, and abnormally abrasive maintenance equipment are not normal traffic use and are exempted from warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of 1 of following, only where specifically named in product category:
1. Advanced Polymer Technology (APT), Harmony, PA
 2. BASF Building Systems (BASF), Shakopee, MN
 3. Deneef Construction Chemicals (Deneef), Houston, TX.
 4. Lymtal International Inc. (Lymtal), Lake Orion, MI.
 5. Neogard Division of Jones-Blair Company (Neogard), Dallas, TX.
 6. Pacific Polymers, Inc. a Division of ITW (Pacific Polymers), Garden Grove, CA
 7. Poly-Carb Inc. (Poly-Carb), Twinsburg, OH.
 8. Polycoat Products Division of Amer. Polymers (Polycoat), Santa Fe Springs, CA.
 9. Pecora Corporation (Pecora), Harleysville, PA
 10. Sika Corporation (Sika), Lyndhurst, NJ.
 11. Technical Barrier Systems, Inc. (TBS), Oakville, Ontario.
 12. Tremco (Tremco), Cleveland, OH.

2.2 MATERIALS, TRAFFIC COATING

- A. Acceptable coatings are listed below. Contractor to confirm that coatings are compatible with all other materials in this Section and other Division 07 Sections and related work.
1. Heavy Duty:
 - a. Autogard HD-48, Autogard E, Neogard.
 - b. Elasto-Deck 5000-HT, Pacific Polymers.
 - c. Iso-Flex 750U-HL HVT/760U-HL HVT Deck Coating System, LymTal.
 - d. MasterSeal Traffic 1500, BASF.
 - e. Qualideck Heavy Vehicular (152/252/372/512), APT
 - f. Sikalastic 710/715, Sika.
 - g. Vulkem 350/345/346/346 Deck Coating System, Tremco.

- h. Pecora-Deck 800 Series.
 - i. Kelmar TE Exposure 3, TBS.
 - j. Flexodeck Mark 170.2 Solvent Free Heavy Duty, Poly-Carb.
 - k. Poly-I-Gard 246HD, Polycoat.
- B. Provide ultraviolet screening for all traffic coating placed on this project.
- C. Color of finish top coat shall be as selected by Owner from manufacturer's full range.
- D. Substitutions: **None** for this project. Contact Engineer/Architect for consideration for future projects.

2.3 MATERIALS, CRACK SEALER

- A. Repair for isolated random horizontal cracks 0.01 in. to 0.06 in. wide. Acceptable products:
 - 1. Denedeck Crack Sealer, Deneef.
 - 2. Iso-Flex 609 Epoxy Crack Sealer, Lyntal.
 - 3. MasterSeal 630, BASF.
 - 4. Sikadur 55 SLV Epoxy Crack Healer/Sealer, Sika.
 - 5. SikaPronto 19TF, Sika.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive Work and report immediately in writing to Engineer/Architect any deficiencies in surface which render it unsuitable for proper execution of Work.
- B. Coordinate and verify that related Work meets following requirements before beginning surface preparation and application:
 - 1. Concrete surfaces are finished as acceptable for system to be installed. Correct all high points, ridges, and other defects in a manner acceptable to Engineer/Architect.
 - 2. Curing compounds (if present) on concrete surfaces are compatible with system to be installed.
 - 3. Concrete surfaces have completed proper curing period for system selected.
 - 4. Joint Sealants are compatible with traffic coatings.

3.2 PREPARATION

- A. Seal all openings to occupied space to prevent cleaning materials, solvents, and fumes from infiltration. All protective measures and/or ventilating systems required to prevent infiltration are incidental to this Work.
- B. Acid etching is prohibited.
- C. Remove all laitance and surface contaminants, including oil, grease, and dirt as specified by manufacturer's written recommendations.
- D. Remove all debonded traffic coatings. Remove all laitance and surface contaminants, including oil, grease, and dirt, by shotblasting and appropriate degreasers, or as specified by manufacturer's written recommendations to provide warranty.
- E. Before applying materials, apply system to small area to assure that it will adhere to substrate and joint sealants and dry properly and to evaluate appearance.
 - 1. Coating manufacturer shall provide written acceptance of surface preparation and adhesion prior to start of full scale operations.
- F. All random cracks on concrete surface less than 0.03 in. wide and showing no evidence of water and/or salt water staining on ceiling below shall receive detail coat unless more complete treatment required in accordance with manufacturer's recommendations. Rout and seal random cracks, construction joints, and control joints prior to installation of primer or base coat.
- G. Mask off adjoining surfaces not to receive traffic coating and mask off drains to prevent spillage and migration of liquid materials outside membrane area. Provide neat/straight lines at termination of traffic coating.

3.3 INSTALLATION/APPLICATION

- A. Installation requires all of the following steps:
 - 1. Surface Preparation: Prepare concrete/existing coatings for system application.
 - 2. Crack/Construction/Control/Cove Joint Sealing: Detail for crack bridging.
 - 3. Primer Coat: Insure proper adhesion of membrane to substrate.
 - 4. Base Coat: Provide crack spanning in conjunction with Crack Detail noted above.
 - 5. Aggregate Coat – to hold aggregate in system, providing skid and wear close up resistance.
 - 6. Aggregate: Correct size, shape, hardness, and amount necessary to insure proper skid and wear resistance. Match approved project samples/mockups.
 - 7. Top Coat: Lock aggregate into place, provide a maintainable surface and provide resistance to ponding water, UV degradation, color loss, and chemical intrusion. Match approved project samples/mockups.

- B. Do all Work in accordance with manufacturer's written instructions and specifications including, but not limited to: moisture content of substrate, atmospheric conditions (including relative humidity and temperature), coverages, mil thicknesses and texture, and as shown on Drawings.
- C. A primer coat is required for all systems. No exception.
- D. Do not apply traffic coating material until concrete has been air dried at temperatures at or above 40 deg F for at least 30 days after curing period specified.
- E. Cease material installation under adverse weather conditions, or when temperatures are outside manufacturer's recommended limitations for installation, or when temperature of work area or substrate are at or below 40 deg F.
- F. All adjacent vertical surfaces shall be coated with traffic coating minimum of 4 in. above coated horizontal surface. Requirement includes, but is not limited to: pipes, columns, walls, curbs (full height of vertical faces of all curbs), islands, etc.
- G. Complete all Work under this Section before painting line stripes.
- H. Clean off excess material and material smears adjacent to joints as work progresses using methods and materials approved by manufacturers.

3.4 FIELD QUALITY CONTROL

- A. Develop a quality control plan for assured specified uniform membrane thickness that utilizes grid system of sufficiently small size to designate coverage area of not more than 5 gallons at specified thickness. In addition, employ wet mil gauge to continuously monitor thickness during application. Average specified wet mil thickness shall be maintained within grid during application with minimum thickness of not less than 80% of average acceptable thickness. Immediately apply more material to any area not maintaining these standards.
- B. Testing Agency employ wet mil gauge to periodically monitor thickness during application.
- C. Install 1 trial section of coating system for each duty grade and/or recoat system specified. Do not proceed with further coating application until trial sections accepted in writing by Engineer/Architect. Remove and replace rejected trial sections with acceptable application. Trial section shall also be tested for:
 - 1. Wet mil thickness application.
 - 2. Adhesion to concrete substrate and/or existing coating(s).
 - 3. Overall dry mil thickness.
- D. Use trial sections to determine adequacy of pre-application surface cleaning. Obtain Owner, Engineer/Architect, and manufacturer acceptance of:
 - 1. Cleaning before proceeding with traffic coating application.

2. Visual appearance of finished coating application.
3. Conformance to ADA static coefficient of friction.
4. Elcometer or equivalent pull test to quantify traffic coating adhesion to concrete and existing traffic coating.

E. Determine overall coating system mil thickness:

1. Contractor shall provide 6 in. by 6 in. bond breaker (coating coupon) on concrete surface for each 20,000-sq. ft., or fraction thereof, of coating to be placed as directed by Engineer/Architect and manufacturer. Dimensionally locate coupon for easy removal. Coordinate with manufacturer and testing agency.
2. Contractor shall assist Testing Agency in removing coating coupons from concrete surface at completion of manufacturer-specified cure period. Contractor shall repair coupon area per coating manufacturer's instructions.
3. Testing Agency shall determine dry mil thickness of completed Traffic Coating System, including bond breaker. Take 9 readings (minimum), 3 by 3 pattern at 2 in. on center. No reading shall be taken closer than 1 in. from coupon edge. Report individual readings and overall coating system average to Engineer/Architect. Readings shall be made with micrometer or optical comparator.

END OF SECTION 071800

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SECTION 071810 - EPOXY BROADCAST OVERLAY SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This work consists of furnishing and placing an overlay system comprised of a two-component epoxy resin system with broadcast aggregate for the purpose of improving skid resistance and sealing the concrete surface. The surface of the concrete shall be prepared and two applications of the epoxy-aggregate system shall be made in accordance with these specifications. The Contractor shall install an aggregate wearing course that is provided through a single manufacturer.
- B. Materials shall be compatible with materials or related Work with which they come into contact, and with materials covered by this Section.

1.3 QUALITY ASSURANCE

- A. Submit following information for field testing of epoxy broadcast overlay installation unless modified in writing by Engineer.
 - 1. Project name and location.
 - 2. Contractor's name.
 - 3. Epoxy material supplier.
 - 4. Date of report.
 - 5. Placement location within structure.
 - 6. Epoxy material data:
 - a. Epoxy type.
 - b. Application rate (gals/sf).
 - c. Aggregate rate (lbs./sf).
 - d. Area applied (sf).
 - 7. Weather data:
 - a. Air temperatures.
 - b. Weather.
 - c. Wind speed.

8. Written acceptance of surface preparation from manufacturer representative.
9. Written acceptance of installation/application of epoxy from manufacturer representative.

1.4 REFERENCES

- A. "Standard Specifications for Structural Concrete," (ACI 301) by American Concrete Institute, herein referred to as ACI 301, is included in total as specification for this structure except as otherwise specified herein.
- B. Comply with provisions of following codes, specifications, and standards except where more stringent requirements are shown on Drawings or specified herein:
 1. "Building Code Requirements for Reinforced Concrete," (ACI 318), American Concrete Institute, herein referred to as ACI 318.
 2. "Causes, Evaluation, and Repair of Cracks in Concrete Structures" (ACI 224.112), American Concrete Institute.
 3. "State-of-the-Art Report on Parking Structures" (ACI 326), American Concrete Institute.
 4. "Use of Epoxy Compounds with Concrete" (ACI 503), American Concrete Institute.
 5. "Standard Specification for Bonding Hardened Concrete, Steel, Wood, Brick, and Other Materials to Hardened Concrete with a Multi-Component Epoxy Adhesive" (ACI 503.1), American Concrete Institute.
 6. "Specification for Producing a Skid-Resistant Surface on Concrete by the Use of Epoxy and Aggregate" (ACI 503.3), American Concrete Institute
 7. "Guide for Repair of Concrete Bridge Superstructures" Reported by ACI Committee 546 (ACI 546.1).
- C. Contractor shall have following ACI publications at Project construction site at all times:
 1. "Use of Epoxy Compounds with Concrete" (ACI 503), American Concrete Institute.
 2. "Standard Specification for Bonding Hardened Concrete, Steel, Wood, Brick, and Other Materials to Hardened Concrete with a Multi-Component Epoxy Adhesive" (ACI 503.1), American Concrete Institute.
 3. "Specification for Producing a Skid-Resistant Surface on Concrete by the Use of Epoxy and Aggregate" (ACI 503.3), American Concrete Institute.

1.5 SUBMITTALS

- A. Make submittals in accordance with requirements of the contract and as specified in this Section.
- B. Contractor: Submit manufacturer's product data sheets, technical sheets, surface preparation procedures and equipment, recommended application procedures and information on epoxy broadcast system.

- C. The Contractor shall submit documentation that confirms his having a minimum of five years of experience in the use and application of similar specified materials or the Contractor shall retain the services of a manufacturer's representative with said experience.

1.6 CLOSEOUT SUBMITTALS

- A. Three copies of System Maintenance Manual.
- B. Five copies of snow removal guidelines for areas covered by Warranty.
- C. Final executed Warranty.

1.7 WARRANTY

- A. System manufacturer and Contractor shall furnish Owner a written single source performance warranty that the epoxy overlay system will be free of defects related to design, workmanship, or material deficiency for 5-year period from date of acceptance of Work required under this Section against leakage, bond failure, and excessive aggregate loss:
- B. Any repair under this warranty shall be done at no cost to Owner. Warranty shall be provided by Contractor and manufacturer of system.

1.8 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Owner retains right to reject any manufacturer.
 - 1. Evidence of acceptable previous work on WALKER-designed projects. If none, so state.
 - 2. Evidence of financial stability acceptable to Engineer/Architect.
 - 3. Listing of 10 or more projects completed with submitted system, to include:
 - a. Name and location of project.
 - b. Type of system applied.
 - c. On-Site contact with phone number.
- B. Manufacturer's technical representative, acceptable to Engineer/Architect, shall be on site during surface preparation and initial stages of installation.
- C. Installer's Qualifications: Owner retains right to reject any installer.
 - 1. Evidence that installer has successfully performed or has qualified staff who have successfully performed at least 2 verifiable years of installations similar to those involved in this Contract, and minimum 5 projects with submitted system.
 - 2. Listing of 3 or more installations in climate and size similar to this Project performed by installer's superintendent.

- D. Testing Agency: Independent testing laboratory employed by Owner and acceptable to Engineer/Architect.
- E. Certifications:
 - 1. Licensing/certification document from system manufacturer that confirms system installer is a licensed/certified applicator for the manufacturer and is legally licensed to perform work in the state of Michigan.
 - 2. Licensing/certification agreement shall include following information:
 - a. Applicator's financial responsibility for warranty burden under agreement terms.
 - b. Manufacturer's financial responsibility for warranty burden under agreement terms.
 - c. Process for dispute settlement between manufacturer and applicator in case of system failures where cause is not evident or cannot be assigned.
 - d. Authorized signatures for both Applicator Company and Manufacturer.
 - e. Commencement date of agreement and expiration date (if applicable).

1.9 DELIVERY, STORAGE, 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. Manufacturer's instructions for mixing.
 - 6. Warning for handling and toxicity.
 - 7. Expiration date.
- B. Store materials under cover and protect from weather at temperatures between 40-100 deg F. Replace packages or materials showing any signs of damage with new material at no additional cost to Owner.
- C. At no time shall weight of stored material being placed on slab area exceed total design load of slab area. Provide temporary shoring as needed to support construction loads (incidental).

1.10 FIELD CONDITIONS

- A. Weather and Substrate Conditions: Proceed with work only when existing and forecast weather and temperature of concrete substrate will permit work in accordance with manufacturer's recommendations.
- B. Dispose of unused materials in accordance with MSDS.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Epoxy Resin System: The epoxy resin system shall be a two-component, 100% solids (Zero VOC), low-modulus, flexible, high-elongation, moisture-insensitive and fuels resistant system. It shall be in accordance with the following requirements:
1. Properties of the mixed epoxy resin:
 - a. Pot Life, 1 qt., (AASHTO T-237): 15-35 minutes at 73 deg F.
 2. Properties of the cured epoxy resin shall meet material requirements of ASTM C881, Type III, and as follows:
 - a. Compressive Properties (ASTM D-695):
 - 1) Compressive Strength at 7 days: 4,000-7,000 psi
 - b. Compressive Properties (ASTM C-109):
 - 1) Compressive Strength at 4 hours: 1,400 psi
 - 2) Compressive Strength at 7 days: 7,000 psi
 - c. Tensile Properties (ASTM D-638) at 7 days:
 - 1) Tensile Strength: 2,200 psi
 - 2) Elongation at Break: 30 percent minimum
 - d. Water Absorption, 24 hr. %, (ASTM D570) : <0.5
 - e. Thermal Compatibility, (ASTM C-884): Passing
 - f. Effective Shrinkage, (ASTM C-883): Passing
 - g. Adhesion to Concrete, (ACI Method 503R-30): Concrete Failure
- B. Fine Aggregate: An aggregate wearing surface shall be broadcast into a liquid binder according to the manufacturer's specifications. The fine coarse aggregates shall be those typically used for high performance surfaces. Aggregates shall consist of clean, hard, durable, non-staining and non-corroding fragments such as flint, chert, emery, or basaltic sand that are primarily angular or sub-angular in shape and have been crushed. Particle material, size, shape and surface texture shall be optimized for the binder. Aggregates shall have a proven record of durability in this type of application. The aggregate's origin shall not be from ocean or salt water sources unless it has been washed and certified as chloride-free. All aggregate shall be stored in a dry, moisture-free atmosphere. The aggregate shall be fully protected from any contaminants on the job site and shall be stored so as not to be exposed to rain or other moisture sources. Alternate aggregates may be used as approved by the Engineer. The aggregate used shall contain at least 10 percent aluminum oxide and conforming to following Tables.

TABLE 1

FINE AGGREGATE GRADATION

	Bridge Deck	Parking Deck or Pedestrian Walkway
Sieve Size	Percent Passing	
#4	100	100
#8	30~75	51-75
#16	5(max)	14-50
#30	1	0-25
#200	0.2	0-2

- C. The aggregate shall conform to the properties listed in Table 2 below:

TABLE 2

FINE AGGREGATE PROPERTIES

TESTS	Method	Limit
Los Angeles Abrasion (after 500 revolutions)	AASHTO T 96	40% max
MOHS Scale of Hardness	MOHS	7 min
Moisture Content ASTM C566	By Weight	<= 0.2%

- D. Equipment: All equipment for cleaning the existing concrete surface and mixing and applying the epoxy-aggregate system shall be in accordance with the epoxy manufacturer's recommendations as approved by the Engineer prior to commencement of any work.

2.2 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products from the following manufacturers.
1. Unitex Chemical Co., a division of Dayton Superior
 2. Sika Corporation
 3. BASF Construction Chemicals - Building Systems
 4. LymTal International, Inc.
 5. ChemCo Systems
 6. The Euclid Chemical Company
 7. IPA Systems, Inc.

- B. Acceptable epoxy broadcast overlay systems are listed below. Epoxy broadcast system shall meet the above requirements and specifications.
1. Unitex Total Overlay System – Dayton Superior, Miamisburg, OH.
 2. Sikadur Epoxy Broadcast Overlay System – Sika Corp, Lyndhurst, NJ.
 3. MasterSeal 350 – BASF Construction Chemicals – Building Systems, Shakopee, MN.
 4. Iso-Flex 200 Epoxy Overlay System - LymTal International, Lake Orion, MI.
 5. Kemko 128 FlexDek Binder - ChemCo Systems, Inc., Redwood City, CA.
 6. Flexolith – The Euclid Chemical Company, Cleveland, OH.
 7. Ipanol E-Flex – IPA Systems, Inc.
- C. Substitutions: **None** for this project. Contact Engineer/Architect for consideration for future projects.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

- A. Weather and Substrate Conditions for Epoxy: Do not proceed with application (except with written recommendation of manufacturer) under any of the following conditions:
1. Ambient temperature is less than 50° F.
 2. Substrate surfaces have cured for less than 1 month.
 3. Rain or temperatures below 50 deg F predicted for a period of 24 hours.
 4. Earlier than 24 hours after surfaces became wet.
 5. Substrate is frozen or surface temperature is less than 50° F.
- B. Weather and Substrate Conditions for Other Materials: Proceed with work only when existing and forecast weather and temperature of concrete substrate will permit work in accordance with manufacturer's recommendations.

3.2 PREPARATION

- A. The overlay system shall be applied in accordance with these specifications at the locations indicated on the plans. The quantities and rates shown are for typical situations only. Exact quantities and rates shall be as recommended by the manufacturer and approved by the engineer. Total dry film thickness of the epoxy overlay system exclusive of aggregate shall be a minimum of **105 dry mils for vehicular** epoxy broadcast systems. Refer to Detail 16.9 for further information regarding required thickness of system.
1. Trial Application: Prior to constructing the overlay, one or more trial overlays shall be placed to determine the initial set time and to demonstrate the effectiveness of the mixing, placing, and finishing equipment proposed. Each overlay shall be 10 ft. wide, at least 10 feet long and the same thickness as the overlay to be constructed. Conditions during the construction of the trial overlays and equipment used shall be similar to the expected and those to be used for construction of the

multilayer epoxy-overlay. The location of the trial overlays shall be approved by the Engineer.

2. Surface Preparation: The surface of the concrete deck shall be prepared for application of the overlay by first repairing the concrete deck, scarification, shotblasting, and then abrasive blasting, hydro-blasting, or cleaning as acceptable to the Epoxy Manufacturer and the Engineer so as to remove all delaminations/unsound concrete, laitance, curing compounds, sealers, grease, oils, paint, dirt, or any other contaminants that could interfere with the proper adhesion of the epoxy overlay system in accordance with the following requirements:
 - a. The existing deck shall be rehabilitated prior to the epoxy overlay as shown in the plans. Spalled and delaminated areas of the deck shall be chipped back to sound concrete and repaired per the applicable work items and specifications.
3. After concrete patching repairs, all remaining loose/delaminated existing concrete shall be removed by scarifying up to ½" amplitude.
4. Shotblast Cleaning: Required after scarification. This cleaning shall not commence until all work involving the repair of the concrete deck surface has been completed. Additionally, surface preparation shall not commence until all epoxy mortar repairs and/or concrete mortar repairs are sufficiently cured. Following completion of shotblast cleaning, any loose shot or other particles shall be removed from the deck prior to the application of the overlay.
5. Sand-blasting and/or Water-blasting: After shot-blasting, sand-blasting and/or water-blasting shall then be performed to remove all dust/debris/laitance. Additional surface preparation and/or cleaning shall be performed as needed in strict accordance with manufacturer's recommendations.
6. **Product manufacturer shall provide written approval of surface preparation prior to start of installation.**
7. Surface preparation methods will not be measured and paid for separately, but shall be included in the work.

3.3 INSPECTION

- A. Inspect surfaces to receive Work and report immediately in writing to Engineer any deficiencies in surface which render it unsuitable for proper execution of Work.

3.4 INSTALLATION

- A. Do all Work in strict accordance with manufacturer's written instructions and specifications including, but not limited to, moisture content of substrate, atmospheric

conditions (including relative humidity and temperature), coverages, thicknesses, texture and curing.

- B. Manufacturer's technical representative, acceptable to Engineer, shall be on site during surface preparation and installation.
1. Application of Epoxy-Aggregate Overlay. Application of the overlay will not be allowed unless the ambient temperature is a minimum of 50 deg F and rising, and the concrete deck temperature is at least 50 deg F. At cooler temperatures, the material should be conditioned at 75 deg F at least 24 hours prior to use. Additionally, application shall not begin until the concrete deck is completely surface dry. Values shown in this specification are typical of general installations. Actual values and application rates shall be per Manufacturer's recommendations.
 2. Mixing of Epoxy Components: Components A and B shall each be thoroughly stirred in its own container prior to mixing in order to disperse any settlement which may have occurred. Components A and B shall be proportioned in strict accordance with the instructions of the manufacturer and then thoroughly blended together with a mechanical mixing device for at least 2 minutes. Hand mixing is not acceptable. No diluent, thinner, or other foreign material shall be added to either the individual components or the mixed epoxy.
 3. Applying the Overlay: Application of the mixed epoxy to the concrete surface shall be squeegee, roller, or spray, or combinations thereof as approved by the Engineer following the trial application. The application method used shall apply the material smoothly, uniformly, and continuously. The epoxy shall not be allowed to puddle or accumulate in holes or depressions in the deck. The Contractor shall provide suitable coverings, such as heavy-duty drop cloths and the like, to protect all exposed areas not to be overlaid with epoxy, such as curbs, sidewalks, railings, parapets, joints, etc. All damage or defacement resulting from this application shall be cleaned or repaired at the Contractor's expense, to the satisfaction of the Engineer.
 - a. First Coat: The epoxy shall be applied to the concrete deck at a minimum rate of **35-40 square feet per gallon**, unless otherwise recommended by the manufacturer. While the epoxy is still wet broadcast the aggregate until no wet spots are visible. In broadcasting, the aggregate shall be sprinkled or dropped vertically in such a manner so as not to violently disturb the wet epoxy film. When this first coat has cured sufficiently to sustain working traffic, any excess aggregate remaining shall be removed by sweeping or vacuum.
 - b. Second Coat: The second coat shall be applied in a manner identical to the application of the first coat, except that the coverage of the epoxy shall be minimum of **20-25 square feet per gallon** and the aggregate shall be broadcast until no wet spots are visible. When the second coat has cured sufficiently to sustain working traffic, **all excess aggregate remaining shall be removed by sweeping or vacuum.**

- C. Curing. The Contractor shall allow the epoxy overlay to cure sufficiently before subjecting it to loads or traffic of any nature that may damage the overlay. Cure time depends upon the ambient and deck temperatures. The field cure, if approved by the Engineer, can be determined as follows:
 - 1. The overlay shall be considered cured to a firm, hard state when no movement of the overlay can be detected when pressure is applied. Actual degree of cure and suitability for traffic shall be determined by the manufacturer, acceptable to the Engineer, on the actual epoxy concrete overlay.

3.5 FIELD QUALITY CONTROL

- A. Develop a quality control plan for assured specified uniform overlay thickness that utilizes grid system of sufficiently small size to designate coverage area of not more than 5 gallons at specified thickness. In addition, employ wet mil gauge to continuously monitor thickness during application. Average specified wet mil thickness shall be maintained within grid during application with minimum thickness of not less than 80% of average acceptable thickness. Immediately apply more material to any area not maintaining these standards.
- B. Testing Agency employ wet mil gauge to periodically monitor thickness during application.

3.6 ACCEPTANCE

- A. Repair of Surface Defects. The repair method for surface defects in the overlay shall be identical to that used for the application of the overlay. All surface defects shall be repaired to the satisfaction of the Engineer before acceptance of the work is made.
- B. **An additional cleaning of the overlay area is required prior to opening area to traffic to remove all loose or excess aggregate by sweeping or vacuum. Repeat as needed to Owner's satisfaction.**
- C. The manufacturer shall furnish certification to the Engineer that the material supplied is in accordance with all requirements specified and stating that the material supplied is the same system and is identically formulated to the material tested for manufacturer and brand name approval.

END OF SECTION 071810

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SECTION 071900 – WATER REPELLENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. A single installer shall be responsible for providing complete waterproofing system, including all products specified in Division 07 Sections.
- B. This Section includes penetrating concrete sealer on supported concrete floor surfaces.
- C. Related Sections: Following Sections contain requirements that relate to this Section.

1.3 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM D6489, "Standard Test Method for Determining the Water Absorption of Hardened Concrete Treated with a Water Repellent Coating."

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Materials shall be compatible with materials or related Work with which they come into contact, and with materials covered by this Section.
 - 2. Distribute reviewed submittals to all others whose Work is related.
- B. Make submittals in accordance with requirements of Division 01 Sections.
- C. Submittals and Resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal data the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including the cost of Engineer's services made necessary to review such additional resubmittals. Owner shall in turn reimburse Engineer.

D. Requests for Information

1. Engineer reserves the right to reject, unprocessed, any Request for Information (RFI) that the Engineer, at its sole discretion, deems frivolous.
2. Engineer reserves the right to reject, unprocessed, any RFI that the Engineer, at its sole discretion, deems already answered in the Contract Documents.
3. RFI process shall not be used for requesting substitutions. Procedures for substitutions are clearly specified elsewhere in the contract documents.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated at least 60 days prior to application.

1. Product description, technical data, appropriate applications, and limitations.
2. Areas and application rates of materials to be applied.
3. Proposed alternate application methods, if any.

1.6 INFORMATION SUBMITTALS

A. Certificates:

1. Certification that products and installation comply with applicable federal, state of Michigan, and local EPA, OSHA and VOC requirements regarding health and safety hazards.
2. Evidence of applicator's being certified by manufacturer. Evidence shall include complete copy of manufacturer's licensing/certification document, spelling out repair responsibility for warranty claims.

B. Field Quality Control:

1. ASTM D6489 Test Results.
2. Two copies of manufacturer's technical representative's log for each visit.

C. Qualification Statements:

1. Manufacturer's qualifications as defined in the "Quality Assurance" article.
2. Installer's qualifications as defined in the "Quality Assurance" article.
3. Signed statement from applicator certifying that applicator has read, understood, and shall comply with all requirements of this Section.

1.7 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Owner retains right to reject any manufacturer.

1. Evidence of acceptable previous work on WALKER-designed projects. If none, so state.
2. Evidence of financial stability acceptable to Engineer/Architect.

3. Listing of 20 or more projects completed with submitted system, to include:
 - a. Name and location of project.
 - b. Type of system applied.
 - c. On-Site contact with phone number.
- B. Installer's Qualifications: Owner retains right to reject any installer.
 1. Evidence of compliance with Summary article paragraph "A single installer. . ."
 2. Evidence that installer has successfully performed or has qualified staff who have successfully performed at least 5 verifiable years of installations similar to those involved in this Contract, and minimum 10 projects with submitted system.
 3. Listing of 5 or more installations in climate and size similar to this Project performed by installer's superintendent.
- C. Testing Agency: Independent testing laboratory employed by Owner and acceptable to Engineer/Architect.
- D. Certifications:
 1. Sealer shall satisfy the current national and local Volatile Organic Compound (VOC) Emission Standards for Architectural Coatings.
 2. Licensing/certification document from system manufacturer that confirms system installer is a licensed/certified applicator for the manufacturer and is legally licensed to perform work in the state of Michigan.
 3. Licensing/certification agreement must provide following information:
 - a. Applicator's financial responsibility for warranty burden under agreement terms.
 - b. Manufacturer's financial responsibility for warranty burden under agreement terms.
 - c. Process for dispute settlement between manufacturer and applicator in case of system failures where cause is not evident or cannot be assigned.
 - d. Officers' signatures for both Applicator Company and Manufacturer.
 - e. Commencement date of agreement and expiration date (if applicable).

1.8 DELIVERY, STORAGE, 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 preparation.
 4. Lot or batch number.
- B. Store materials under cover and protect from weather. Replace packages or materials showing any signs of damage with new material at no additional cost to Owner.

- C. At no time shall weight of stored material being placed on slab area exceed total design load of slab area.

1.9 FIELD CONDITIONS

- A. Weather and Substrate Conditions: Do not proceed with application (except with written recommendation of manufacturer) under any of the following conditions:
 - 1. Ambient temperature is less than 40° F.
 - 2. Substrate surfaces have cured for less than 1 month.
 - 3. Rain or temperatures below 40° F predicted for a period of 24 hours.
 - 4. Less than 24 hours after surfaces became wet.
 - 5. Substrate is frozen or surface temperature is less than 40° F.
 - 6. Wind velocities higher than manufacturer's specified limit to prevent solvent flash-off.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of following, only where specifically named in product category:
 - 1. Advanced Chemical Technologies Inc. (ACT), Oklahoma City, OK.
 - 2. BASF Building Systems (BASF), Shakopee, MN.
 - 3. Deneef Construction Chemicals (Deneef), Houston, TX.
 - 4. Evonik Degussa Corporation (Evonik Degussa), Parsippany, NJ.
 - 5. Euclid Chemical Company (Euclid), Cleveland, OH.
 - 6. Lymtal International Inc. (Lymtal), Lake Orion, MI.
 - 7. Prosoco, Inc. (Prosoco), Lawrence, KS
 - 8. Sika Corporation (Sika), Lyndhurst, NJ.

2.2 MATERIALS, CONCRETE SEALER

- A. Silane (90% or greater solids, 400 g/L or less VOC):
 - 1. MasterProtect H 1000, 200 sf/g, BASF.
 - 2. Iso-Flex 618-100 CRS, 200 sf/g, Lymtal.
 - 3. Protectosil BHN, 200 sf/g, Evonik Degussa Corp.
 - 4. Sikagard 705L ,200 sf/g, Sika.
 - 5. Sil-Act ATS-100 LV, 200 sf/g, ACT.
- B. Proposed substitutions: None for this project. Contact Engineer/Architect for consideration for future projects.

2.3 MATERIALS, CRACK SEALER

- A. Repair for isolated random horizontal cracks 0.01 in. to 0.06 in. wide. Acceptable products:
 - 1. SikaPronto 19TF, Sika.
 - 2. Sikadur 55 SLV Epoxy Crack Healer/Sealer, Sika.
 - 3. MasterSeal 630, BASF.
 - 4. Denedeck Crack Sealer, Deneef.
 - 5. Iso-Flex 609 Epoxy Crack Sealer, Lyntal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive Work and report immediately in writing to Engineer/Architect any deficiencies in surface which render it unsuitable for proper execution of Work.
- B. Coordinate and verify that related Work meets following requirements before beginning surface preparation and application:
 - 1. Concrete surface finishes are acceptable for system to be installed.
 - 2. Curing compounds used on concrete surfaces are compatible with system to be installed.
 - 3. Concrete surfaces have completed proper curing period for system selected.
 - 4. Control joint and expansion joint Work is complete and has been accepted by Engineer/Architect.

3.2 PREPARATION

- A. Seal all openings to occupied space to prevent cleaning materials, solvents and fumes from infiltration. All protective measures and/or ventilating systems required to prevent infiltration are incidental to this Work.
- B. Acid etching is prohibited.
- C. Repair or replace all sealant materials damaged by surface preparation operations.
- D. Shot blast clean all surfaces to be sealed as acceptable to sealer manufacturer before sealer application. Cleaning method and materials shall be sufficient to allow absorption criteria stated in Field Quality Control article to be met. Prepare by sandblasting all surfaces inaccessible to shotblast equipment.
- E. Equipment used during floor slab cleaning shall not exceed height limitation of facility and shall not exceed 3,000 lb axle load or vehicle gross weight of 6,000 lb.

- F. Mask off adjoining surfaces not to receive sealer and mask off drains to prevent spillage and migration of liquid materials outside sealer area. Provide neat/straight lines at termination of sealer.

3.3 INSTALLATION/APPLICATION

- A. Do all Work in accordance with manufacturer's written instructions and specifications including, but not limited to: moisture content of substrate, atmospheric conditions (including relative humidity and temperature), coverage, mil thickness and texture, and as shown on Drawings.
- B. Clean all surfaces affected by sealer material overspray and repair all damage caused by sealer material overspray to adjacent construction or property at no cost to Owner.
- C. Clean off excess material as work progresses using methods and materials approved by manufacturer.

3.4 FIELD QUALITY CONTROL

- A. **Install 3 trial sections of sealer** to verify treated surface is not glazing as result of sealer application. If application of sealer causes glazing at trial section, contact sealer manufacturer to obtain written recommendations for solving problem. **Do not proceed with sealer application following trial section applications until directed to do so in writing by Engineer.**

END OF SECTION 071900

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SECTION 079233 – CONCRETE JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. A single installer shall be responsible for providing complete waterproofing system, including all products specified in Division 07 Sections.
- B. This Section includes the following:
 - 1. Exterior joints in the following horizontal traffic bearing surfaces:
 - a. Construction joints in cast-in-place concrete.
 - b. Control joints in slab-on-grade, pour strips, slabs and topping slabs.
 - c. Joints between precast concrete units.
 - d. Perimeter of floor drains.
 - e. Other joints as indicated on the Drawings.
 - 2. Exterior joints in the following vertical and horizontal non-traffic surfaces:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints between precast concrete units.
 - c. Cove joints at intersection of horizontal and vertical concrete.
 - d. Exterior horizontal joints between precast and cast-in-place concrete. Color to match precast concrete.
 - e. Vertical and horizontal joints between precast beams and columns.
 - f. Other joints as indicated on the Drawings.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Materials shall be compatible with materials or related Work with which they come into contact, and with materials covered by this Section.
 - 2. Distribute reviewed submittals to all others whose Work is related.
 - 3. Coordinate layout of joint system and approve methods for providing joints with Engineer, and concrete contractors and sealant manufacturers.
- B. Make submittals in accordance with requirements of Division 01 Sections.

- C. Submittals and Resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal data the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including the cost of Engineer's services made necessary to review such additional resubmittals. Owner shall in turn reimburse Engineer.
- D. Requests for Information
 - 1. Engineer reserves the right to reject, unprocessed, any Request for Information (RFI) that the Engineer, at its sole discretion, deems frivolous.
 - 2. Engineer reserves the right to reject, unprocessed, any RFI that the Engineer, at its sole discretion, deems already answered in the Contract Documents.
 - 3. RFI process shall not be used for requesting substitutions. Procedures for substitutions are clearly specified elsewhere in the contract documents.

1.4 ACTION SUBMITTALS

- A. Product Data: For each system indicated at least 14 days prior to application.
 - 1. Product description, technical data, appropriate applications and limitations.
 - 2. Primer type and application rate
- B. Samples:
 - 1. One for each system indicated.
- C. Sample Warranty: For each system indicated.

1.5 INFORMATION SUBMITTALS

- A. Certificates:
 - 1. Evidence of installer's being certified by manufacturer. Evidence shall include complete copy of manufacturer's licensing/certification document, spelling out repair responsibility for warranty claims.
 - 2. Certification from the Manufacturer that joint details as specified are acceptable for system to be installed at least 1 month before placement of any concrete which will receive joint sealant.
- B. Field Quality Control:
 - 1. Two copies each of manufacturer's technical representative's log for each visit.
 - 2. Testing agency field and test reports.

C. Qualification Statements:

1. Manufacturer's qualifications as defined in the "Quality Assurance" article.
2. Installer's qualifications as defined in the "Quality Assurance" article.
3. Signed statement from this Section applicator certifying that applicator has read, understood, and shall comply with all requirements of this Section.

1.6 CLOSEOUT SUBMITTALS

- A. Final executed Warranty.

1.7 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Owner retains right to reject any manufacturer.
1. Evidence of acceptable previous work on WALKER-designed projects. If none, so state.
 2. Evidence of financial stability acceptable to Engineer/Architect.
 3. Listing of 20 or more projects completed with submitted sealant, to include:
 - a. Name and location of project.
 - b. Type of sealant applied.
 - c. On-Site contact with phone number.
- B. Manufacturer's technical representative, acceptable to Engineer/Architect, shall be on site during surface preparation and initial stages of installation.
- C. Installer's Qualifications: Owner retains right to reject any installer or subcontractor.
1. Installer shall be legally licensed to perform work in the state of Michigan. Evidence of compliance with Summary article paragraph "A single installer. . ."
 2. Evidence that installer has successfully performed or has qualified staff who have successfully performed at least 5 verifiable years of installations similar to those involved in this Contract, and minimum 10 projects with submitted sealant.
 3. Listing of 5 or more installations in climate and size similar to this Project performed by installer's superintendent.
- D. Testing Agency: Independent testing laboratory employed by Owner and acceptable to Engineer/Architect.
- E. Certifications:
1. Licensing/certification document from system manufacturer that confirms sealant installer is a licensed/certified applicator for the manufacturer and is legally licensed to perform work in the state of Michigan.
 2. Licensing/certification agreement shall include following information:

- a. Applicator's financial responsibility for warranty burden under agreement terms.
- b. Manufacturer's financial responsibility for warranty burden under agreement terms.
- c. Process for dispute settlement between manufacturer and applicator in case of system failures where cause is not evident or cannot be assigned.
- d. Authorized signatures for both Applicator Company and Manufacturer.
- e. Commencement date of agreement and expiration date (if applicable).

1.8 DELIVERY, STORAGE, 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 preparation.
 4. Lot or batch number.
- B. Store materials under cover and protect from weather. Replace packages or materials showing any signs of damage with new material at no additional cost to Owner.
- C. Do not store material on slabs to be post-tensioned before final post-tensioning of slabs is accomplished.
- D. At no time shall weight of stored material being placed on slab area exceed total design load of slab area.

1.9 FIELD CONDITIONS

- A. Weather and Substrate Conditions: Proceed with work only when existing and forecast weather and temperature of concrete substrate will permit work in accordance with manufacturer's recommendations.

1.10 WARRANTY

- A. Manufacturer: Furnish Owner with written total responsibility Joint and Several Warranty, detailing responsibilities of manufacturer and installer with regard to warranty requirements (Joint and Several). The warranty shall provide that sealant will be free of defects, water penetration, and chemical damage related to system design, workmanship or material deficiency, consisting of:
 1. Any adhesive or cohesive failures.
 2. Weathering.
 3. Abrasion or tear failure resulting from normal traffic use.

- B. If material surface shows any of defects listed above, supply labor and material to repair all defective areas and to repaint all damaged line stripes.
- C. Warranty period shall be a 5-year Joint and Several Warranty commencing with date of acceptance of work.
- D. Perform any repair under this warranty at no cost to Owner.
- E. Address the following in the terms of the Warranty:
 - 1. Length of warranty.
 - 2. Change in value of warranty – if any – based on length of remaining warranty period.
 - 3. Transferability of warranty.
 - 4. Responsibilities of each party.
 - 5. Notification procedures.
 - 6. Dispute resolution procedures.
 - 7. Limitations of liability for direct and consequential damages.
- F. Snowplows, vandalism, and abnormally abrasive maintenance equipment are not normal traffic use and are exempted from warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of 1 of following, only where specifically named in product category:
 - 1. BASF Building Systems (BASF), Shakopee, MN.
 - 2. Dow Corning Corp. (Dow Corning), Midland, MI.
 - 3. Lyntal International Inc. (Lyntal), Lake Orion, MI.
 - 4. Pecora Corporation (Pecora), Harleysville, PA.
 - 5. Sika Corporation (Sika), North Canton, OH.
 - 6. Tremco (Tremco), Cleveland, OH.

2.2 MATERIALS, JOINT SEALANT SYSTEM

- A. Provide complete system of compatible materials designed by manufacturer to produce waterproof, traffic-bearing control joints as detailed on Drawings.
- B. Compounds used for sealants shall not stain masonry or concrete. Aluminum pigmented compounds not acceptable.
- C. Color of sealants shall match adjacent surfaces.
- D. Closed cell or reticulated backer rods: Acceptable products:

1. "Sof Rod," Nomaco Inc., 501 NMC Drive, Zebulon, NC 27597. (800) 345-7279 ext. 341.
 2. "ITP Soft Type Backer Rod," Industrial Thermo Polymers Limited, 2316 Delaware Ave., Suite 216, Buffalo, NY 14216. (800) 387-3847.
 3. "MasterSeal 921 Backer Rod," BASF.
- E. Bond Breakers and Fillers: As recommended by system manufacturer.
- F. Primers: As recommended by sealant manufacturer.
- G. Acceptable sealants are listed below. Sealants shall be compatible with all other materials in this Section and other Division 07 Sections, and related work.
- H. Acceptable polyurethane control joint sealants (traffic bearing):
1. MasterSeal SL-2 or MasterSeal SL-2 SG, BASF.
 2. Iso-flex 880 GB or Iso-flex 881, Lymtal.
 3. Dynatrol II-SG or Urexpan NR 200, Pecora.
 4. Sikaflex-2c SL or Sikaflex-2c NS TG, Sika.
 5. THC-900, THC-901, Vulkem 45SSL, Dymeric 240, Dymeric 240 FC or Dymonic 100, Tremco.
- I. Acceptable polyurethane vertical and cove joints sealants (non-traffic bearing):
1. Sikaflex-2c NS, Sika.
 2. MasterSeal NP-2, BASF.
 3. Dymeric 240/240FC, Dymonic 100 or THC 901 (cove only), Tremco.
 4. Dynatred, Pecora.
 5. Iso-flex 881, Lymtal.
- J. Proposed Substitutions: None for this project. Contact Engineer/Architect for consideration for future projects.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive Work and report immediately in writing to Engineer/Architect any deficiencies in surface which render it unsuitable for proper execution of Work.
- B. Coordinate and verify that related Work meets following requirements before beginning installation.
1. Concrete surfaces are finished as acceptable for system to be installed.
 2. Curing compounds used on concrete surfaces are compatible with system to be installed.
 3. Concrete surfaces have completed proper curing period for system selected.

3.2 PREPARATION

- A. Seal all openings to occupied space to prevent cleaning materials, solvents and fumes from infiltration. All protective measures and/or ventilating systems required to prevent infiltration are incidental to this Work.
- B. Correct unsatisfactory conditions before installing sealant system.
- C. Acid etching is prohibited.
- D. Grind joint edges smooth and straight with beveled grinding wheel before sealing. All surfaces to receive sealant shall be dry and thoroughly cleaned of all loose particles, laitance, dirt, dust, oil, grease or other foreign matter. Obtain written approval of method from system manufacturer before beginning cleaning.
- E. Final preparation of joints shall be a sandblast with medium that removes dust and ground material from surfaces to receive sealant.
- F. Check preparation of substrate for adhesion of sealant.
- G. Prime and seal joints and protect as required until sealant is fully cured. A primer coat is required for all systems.

3.3 INSTALLATION/APPLICATION

- A. Do all Work in strict accordance with manufacturer's written instructions and specifications including, but not limited to: moisture content of substrate, atmospheric conditions (including relative humidity and temperature), thicknesses and texture, and as shown on Drawings.
- B. Completely fill joint without sagging or smearing onto adjacent surfaces.
- C. Self-Leveling Sealants: Fill horizontal joints slightly recessed to avoid direct contact with wheel traffic.
- D. Non-Sag Sealants: Tool joints concave: Wet tooling not permitted.
- E. Clean off excess material and material smears adjacent to joints as work progresses using methods and materials approved by manufacturers.
- F. Cease material installation under adverse weather conditions, or when temperatures are outside manufacturer's recommended limitations for installation, or when temperature of work area or substrate are below 40 deg F.

3.4 FIELD QUALITY CONTROL

- A. Contractor and Engineer/Architect will jointly determine which one of following 2 methods of sealant testing to verify sealant profile:

1. Contractor, at Engineer/Architect's direction, shall cut out sealant at isolated/random locations (varying from in. to ft of material) for Engineer/Architect and Manufacturer's Representative inspection of sealant profile.
- B. Repair all random joint sealant "cut out" sections.
- C. Flood test joints prior to substantial completion. Repair sealants as needed until no leaks observed at no cost to Owner.
- D. Testing Agency:
 1. Check shore hardness per ASTM standard specified in sealant manufacturer's printed data.
 2. If flood test of joints required by this Section, report results to Engineer/Architect.

END OF SECTION 079233

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SECTION 079500 – EXPANSION JOINT ASSEMBLIES

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. A single installer shall be responsible for providing complete waterproofing system, including all products specified in Division 07 Sections.
- B. This Section includes the following: Standard expansion joint systems:
 - a. Elastomeric concrete edged, extruded rubber joint system

1.3 DEFINITIONS

- A. Maximum Joint Width: Widest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.
- B. Minimum Joint Width: Narrowest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.
- C. Movement Capability: Value obtained from the difference between widest and narrowest widths of a joint opening typically expressed in numerical values (mm or inches) or a percentage (plus or minus) of nominal value of joint width. Movement capability is to include anticipated movements from concrete shrinkage, concrete shortening and creep from post-tensioning or pre-stressing, cyclic thermal movements, and seismic movements.
- D. Nominal Joint Width: Width of linear opening specified in practice and in which joint system is installed.
- E. Nominal Form Width: Linear gap in joint system at time of forming or erection of structural elements bounding the expansion joint.
- F. Service Load Level: Defined level of load under which joint assembly remains elastic and fully functional.
- G. Fatigue Load Level: Defined level of load under which joint assembly remains elastic and fully functional, including all noise mitigation components, for the stated number of cycles.

- H. Collapse Load Level: Defined level of load under which joint assembly remains capable of bridging the gap, although plates may yield and components may break.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General:

- a. Coordinate and furnish anchorages, setting drawings, and instructions for installing joint systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.
- b. Coordinate requirements for transitions, tolerances, levelness, and plumbness to ensure the installed expansion joint system can perform with expected movement capabilities.
- c. Coordinate and assign responsibility for preparation of concrete surfaces adjacent to expansion joints.
- d. Expansion joint surface areas each side of joint gap shall have a vertical differential less than $\frac{1}{4}$ " and meet requirements of expansion joint manufacturer.
- e. Minor surface defects shall be repaired according to manufacturer's recommendations. Repair materials shall be compatible with intended system materials and shall be approved by the Engineer prior to surface preparation and installation.
- f. Submit for approval repair products and procedures for all major defects. Repair description shall indicate materials, manufacturer's requirements, expected service life, and maintenance requirements. Take all precautions necessary to avoid damaging adjacent surfaces and embedded reinforcement or post-tensioned anchors and tendons. Contractor is responsible for any damages. Concrete repairs shall be of rectangular configuration, with no feather-edged surfaces. Final surface preparation of all repairs shall be sandblasting, or approved equivalent.
- g. Coordinate layout of joint system and approval of methods for providing joints.

2. Joint Opening Width:

- a. Use temperature adjustment table to properly size joint gap at time of concrete pour and show that proposed joint system is capable of equal individual and combined movements in each direction when installed at designated temperature.
- b. Perform calculations showing joint is capable of movement within design temperature range (Criteria on Drawings), and that design and installation follow manufacturer's recommendations.
- c. Expansion joint movement capability and the actual joint gap movement may not coincide. Construct actual joint gap in accordance with expansion design criteria.

3. Blockouts:

- a. Float expansion joint blockouts to remove all air pockets, voids and spalls caused by form work.
- b. Blockouts shall be plumb with maximum tolerance per Manufacturer or not more than 0.125 inches deviation in 12 inches. Noncompliant blockouts shall be considered major defects.
- c. Blockouts shall be straight and true with maximum tolerance per Manufacturer or not more than 0.250 inches deviation in 10 lineal feet. Noncompliant blockouts shall be considered major defects.

B. Pre-installation Meetings: Meet at project site well in advance of time scheduled for Work to proceed to review requirements for Work and conditions that could interfere with successful expansion joint system performance. Require every party concerned with concrete formwork, blockout, concrete placement, or others required to coordinate or protect the Work thereafter, to attend. Include Engineer of Record and manufacturer's technical representative and warranty officer.

C. Make submittals in accordance with requirements of Division 01 Sections.

D. Submittals and Resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal data the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including the cost of Engineer's services made necessary to review such additional resubmittals. Owner shall in turn reimburse Engineer.

E. Requests for Information:

1. Engineer reserves the right to reject, unprocessed, any Request for Information (RFI) that the Engineer, at its sole discretion, deems frivolous.
2. Engineer reserves the right to reject, unprocessed, any RFI that the Engineer, at its sole discretion, deems already answered in the Contract Documents.
3. RFI process shall not be used for requesting substitutions. Procedures for substitutions are clearly specified elsewhere in the Contract Documents.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated:

1. Construction details, material descriptions, dimensions, and finishes.
2. Proposed method of preparation of concrete surface to receive expansion joint systems.
3. Proposed method and details for treatment of cracks, bugholes, or other potential concrete surface defects in areas to receive expansion joint systems.

4. Horizontal spacing between embedded metals and plates to allow for volume change due to thermal conditions.
 5. Temperature adjustment table showing formed gap at the time of concrete placement calculated at 10 deg F increments and a calculation showing joint system is capable of movement within the design temperature range.
- B. Shop Drawings: For each type of product indicated:
1. Placement Drawings: Show project conditions including, but not limited to: line diagrams showing plans, elevations, sections, details, splices, blackout requirement, and terminations. Provide isometric or clearly detailed drawings depicting how components interconnect. Include reviewed and approved details from others whose work is related. Other information required to define joint placement or installation.
 2. Joint System Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:
 - a. Manufacturer and model number for each joint system.
 - b. Joint system location cross-referenced to Drawings.
 - c. Form width.
 - d. Nominal joint width.
 - e. Movement capability.
 - f. Minimum and maximum joint width.
 - g. Classification as thermal or seismic.
 - h. Materials, colors, and finishes.
 - i. Product options.
 - j. Fire-resistance ratings.
 3. Components and systems required to be designed by a professional engineer, shall bear such professional's written approval when submitted.
- C. Samples: Samples for each type of joint system indicated.
- a. Submit 2 samples for each type. Full width by 6 inches (150 mm) long, for each system required.
 2. Develop mockups of concrete surface preparation for review and to establish a control for the application.
- D. Delegated Design Submittals:
1. Analysis indicating expansion joint system complies with expansion joint performance and design criteria of this specification and is suitable for use in conditions of this project. Provide a summary of design criteria used in design.
- E. Test and Evaluation Reports: Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for current products.

1.6 INFORMATIONAL SUBMITTALS

A. Certificates:

1. Certification that products and installation comply with applicable federal, state of Michigan, and local EPA, OSHA and VOC requirements regarding health and safety hazards.
2. ADA Certification: Prior to installation, submit written certification from manufacturer indicating that expansion joints conform to Americans with Disabilities Accessibility Guidelines for Buildings and Facilities, as published by U.S. Architectural & Transportation Barriers Compliance Board, 1331 F Street, N.W., Suite 1000, Washington, DC 20004-1111. 1-800-872-2253.
 - a. Submit test reports from accredited laboratory attesting to joint systems' movement capability and ADA compliance.
 - b. Static coefficient of friction shall meet minimum requirements of Americans with Disabilities Act (ADA).
3. Signed statement from installer/applicator certifying that installer/applicator has read, understood, and shall comply with all requirements of this Section.
4. Signed statement from manufacturer's representative that they have read, understood, and shall comply with all requirements of this section.

B. Field Quality Control:

1. Two copies each of manufacturer's technical representative's log for each visit.

C. Qualification Statements:

1. Manufacturer's qualifications as defined in the "Quality Assurance" article within 60 days of project award.
2. Installer's qualifications as defined in the "Quality Assurance" article.
3. Evidence of manufacturer's certification of installer/applicator. Evidence shall include complete copy of manufacturer's licensing/certification document, spelling out repair responsibility for warranty claims.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Contracts: 2 copies of Maintenance Program contracts.

B. Operation and Maintenance Data:

1. Maintenance Manual: 3 copies of System Maintenance Manual.
2. Five copies of snow removal guidelines for areas covered by warranty.

C. Warranty Documentation: 2 executed copies of Labor and Material Warranty including all terms, conditions and maintenance requirements.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Owner retains right to reject any manufacturer.
 - 1. Evidence of compliance with Experience Record and Qualifications paragraph below.
 - 2. Evidence of acceptable previous work on WALKER-designed projects. If none, so state.
 - 3. Copy of sample warranty that meets the requirements of the "Warranty" article in Section 1.
 - 4. Evidence of financial stability acceptable to Owner or Engineer/Architect.
 - 5. Evidence of compliance with "Single Installer" requirement.
- B. Experience Record and Qualifications: Verification of systems shall be established by either System Validation or Design Validation.
 - 1. System Validation: Submitted system for similar applications with minimum five (5) years experience and five (5) verified projects completed. Validation submittal shall include:
 - a. Sealed design calculations by an engineer licensed in Michigan, including finite element analysis for all structural load carrying elements, using the design criteria listed in Part 2.
 - b. Field history as defined below.
 - c. Results of seismic load tests defined below for projects with a Seismic Design Category of C or higher.
 - 2. Design Validation: Submitted system for similar application with less than five (5) years experience shall include a design validation submittal. Validation submittal shall include:
 - a. Sealed design calculations by an engineer licensed in Michigan, including finite element analysis for all structural load carrying elements, using the design criteria listed in Part 2.
 - b. Results of cyclic and seismic load tests defined below.
 - 3. Acceptable field history consists of successful performance of five (5) installations in place over the previous five (5) years under similar project loads, traffic frequency, footprints, and joint sizes. Include sketches, photos, and references for each installation. Installations shall have experienced at least moderate levels of traffic.
 - 4. Vertical and horizontal cyclic load tests shall be performed at an independent laboratory, and witnessed by a professional engineer who shall issue a sealed final report of the test results. Tests shall consist of cyclic load testing using the design criteria in Part 2 and project joint sizes. Tests shall meet the following criteria:
 - a. Vertical load cycle counts shall be a minimum of 2, 1000, and 1,000,000 cycles for the collapse, service, and fatigue level loads respectively.
 - b. Horizontal load cycle counts shall be a minimum of 1,000 and 25,000 cycles for the service and fatigue level loads respectively. No horizontal load test is required for the collapse level loads.

- c. The vertical service and fatigue load test shall consist of a rolling tire at specified load in order to gauge joint wear. Test specimen shall show no signs of yielding of load carrying elements.
 - d. Observation and testing results of performance for noise mitigation elements shall be reported.
 - e. Different specimens may be used for the tests if they are of the same size and design. Conditions adjacent to the joint, e.g. the blackout region, shall be in keeping with the system design. Test joints shall be not less than 4 feet per tire in length, and shall replicate typical field installed geometry.
- 5. Seismic load tests shall be performed by an independent laboratory and witnessed by a professional engineer who shall issue a sealed final report of the test results. Tests shall consist of harmonic cycle testing at seismic velocities and displacements.
 - a. Test displacements shall not be less than 85% of the joint's design range, at a frequency not less than 0.5Hz, for not less than 10 cycles.
 - b. Longitudinal displacements (parallel to the joint) shall be 10% of the transverse displacement (perpendicular to the joint), but not less than 1", for joints where only unidirectional movement is expected, and 50%, but not less than 1", for joints in which bidirectional movement is anticipated. Longitudinal and transverse displacements shall be applied simultaneously with a vertical offset of ½" between opposite sides of the joint.
 - c. Seismic testing is not required for small movement joints with seismic design displacements of less than 2" (+/-2", 4" total).
- C. Installer Qualifications: An employer of workers, including superintendent for this project, trained and approved by manufacturer.
- D. Testing Agency: Independent testing laboratory employed by Owner and acceptable to Engineer/Architect.
- E. Certifications:
 - 1. Provide reports to Owner detailing maintenance activities have been performed in accordance with written maintenance agreement for expansion joints.
 - 2. Materials shall be compatible with materials or related Work with which they come into contact and the related materials sections.
 - 3. Manufacturer/Applicator: Review and approve all details before construction. Confirm in writing to Owner.

1.9 DELIVERY, STORAGE 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 preparation.

4. Lot or batch number.
- B. Store materials under cover and protect from weather. Replace packages or materials showing any signs of damage with new material at no additional cost to Owner.

1.10 WARRANTY

- A. Warranty period shall be a 5-year labor and materials warranty commencing with date of Substantial Completion.
- B. Installation Requirements: Include a written plan of construction and coordination requirements, to allow joint system installation to proceed with specified warranty, that specifically addresses the following:
 1. Block out acceptance criteria.
 2. Surface preparation acceptance criteria.
 3. Crack, surface defect, and detailing recommendations.
 4. Method of protection of surrounding surfaces.
 5. Method of expansion joint system installation description.
 6. Primer type and application rate.
 7. Method of preparation of all glands and reinforced membranes.
 8. Temperature, humidity, and other weather constraints. Specify substrate moisture testing criteria, if any.
 9. Final cure time before removal of protection, resumption of traffic, and/or paint striping.
 10. Any other special instructions required to ensure proper installation.
- C. Quality Service Requirements: Show evidence of licensed/approved installer. List of names, addresses and phone numbers, with copies of certification/approval agreement with each, satisfies requirement. Licensing/certification agreement shall include following information:
 1. Installer's financial responsibility for warranty burden under agreement terms.
 2. Manufacturer's financial responsibility for warranty burden under agreement terms.
 3. Process for dispute settlement between manufacturer and installer in case of system failures where cause is not evident or cannot be assigned.
 4. Authorized signatures for both Installer Company and Manufacturer.
 5. Commencement date of agreement and expiration date (if applicable).
 6. Provide copy of contractor's field application quality control procedures.
- D. Warranty shall be jointly executed by Manufacturer and Installer for labor and materials. Detail responsibilities of General Contractor, manufacturer and installer with regard to warranty requirements, as outlined in the Manufacturer's warranty and related Licensing/Certification documents. Warranty shall provide that system shall be free of defects, water penetration and chemical damage related to system design, workmanship or material deficiency, consisting of:
 1. Any water leakage through expansion joint system or leaking conditions of reinforced membrane, other waterproofing components, or glands.

2. Any adhesive or cohesive failures of the system.
 3. Shifting of plates out of alignment due to system failure.
 4. Loose plates, anchor blocks, bolts.
 5. Metal to metal vibration causing noises during use.
 6. Metal to non-metal vibration causing noises during use.
 7. Tears, weathering, or degradation in gland from normal use.
 8. Expansion joint glands are considered defective if they buckle upwards beyond the level of the floor surface after installation or downward in excess of ½ inch below the floor surface.
- E. If expansion joint systems or components show any of defects listed above, supply labor and material to repair all defects at no cost to Owner.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. A single Installer shall be responsible for providing complete expansion joint system. Obtain all joint systems through one source from a single manufacturer.
- B. Drawings indicate size, profiles, and dimensional requirements of joint systems and are schematic for systems indicated.
- C. Do not modify intended aesthetic effects, as judged solely by Engineer, except with Engineer's approval. If modifications are proposed, submit comprehensive explanatory data to Engineer for review.

2.2 PERFORMANCE REQUIREMENTS

- A. Intent of this section is to insure that installed expansion joints allow pedestrian and vehicular traffic to pass in a smooth, quiet fashion with minimal maintenance required over a period of not less than 10 years. Expansion joints shall not only function as structural bridging elements, but must also accommodate structural expansions/contractions and minimize water leakage.
- B. Provide design of expansion joint for preparation of final details for fabrication and construction of all concrete openings, expansion joint elements and required accessories. An integral part of this project is engineering for the following:
 1. Include calculations for the size and forming of concrete openings to provide nominal joint width as indicated on drawings. Provide a summary of the design criteria used in the design.
 2. Include calculations for the appropriate size of expansion joint elements in accordance with the expansion joint assembly performance criteria. Include installation requirements of expansion joint assembly for specific project conditions and scheduling. Provide a summary of design criteria used in design.

- C. Expansion joint design shall meet or exceed all expected movements shown on drawings.
- D. Nominal form width shown on the drawings shall be adjusted for the ambient temperature at time of concrete placement and contractor/expansion joint manufacturer shall verify that width of joint at installation shall meet minimum installation requirements.
- E. Expansion joint systems shall be capable of resisting a differential vertical movement of $\frac{1}{2}$ inch.
- F. Materials shall be supplied in lengths to minimize or eliminate the need to splice waterproofing components.
 - 1. Waterproofing materials directly exposed to vehicular traffic shall be supplied with no joints in vehicle drive aisles.
 - 2. All mitered splices shall be performed at the factory and provide sufficient gland length for butt splicing with field splicing equipment.
 - 3. All Santoprene butt to butt splices shall be heat welded.
 - 4. Butt to butt splices with other materials shall be per manufacturer's recommendations.
- G. Design system for passenger vehicles traveling at speeds normally expected within a parking structure.
- H. Design system for passenger vehicles traveling at speeds higher than those expected in a parking structure.
- I. Walking Surfaces: Expansion joint assemblies at walking areas subject to pedestrian traffic shall provide a smooth, slip resistant walking surface for pedestrians with these minimum requirements:
 - 1. Shall provide walking surfaces in accordance with ASTM – F 1637 Standard Practice for Safe Walking Surfaces.
 - 2. Shall be designed to comply with "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)" and ICC A117.1. Americans with Disabilities Accessibility Guidelines for Buildings and Facilities, as published by U.S. Architectural & Transportation Barriers Compliance Board, 1331 F Street, N.W., Suite 1000, Washington, DC 20004-1111. 1-800-872-2253.
 - 3. Adjoining walkway surfaces shall be flush and meet the following minimum requirements:
 - a. Changes in level of less than $\frac{1}{4}$ inch in height may be without edge treatment as shown in ADA Figure 303.2.
 - b. Changes in Level between $\frac{1}{4}$ inch and $\frac{1}{2}$ inch in height shall be beveled with a slope no greater than 1:2 as shown in ADA Figure 303.3.
 - c. Changes in level greater than $\frac{1}{2}$ inch in height are not permitted unless they can be transitioned by means of a ramp within minimum ADA guidelines.
 - d. Openings in floor or ground surfaces shall not allow passage of a sphere more than $\frac{1}{2}$ inch diameter except as allowed for elevators and platform lifts as shown in ADA Figure 302.3.

2.3 MANUFACTURERS

- A. Subject to compliance with requirements, provide products from one of following manufacturers (listed in alphabetical order), only where specifically named in product categories:
1. Balco Inc., Wichita, KS (Balco).
 2. Construction Specialties, Inc., Muncy, PA (C/S).
 3. Dow Corning Corp., Midland, MI (Dow Corning).
 4. Emseal Joint Systems, Westborough, MA (Emseal).
 5. Erie Metal Specialties, Inc., Akron, NY (EMS).
 6. Inpro Jointmaster, Muskego, WI (Jointmaster)
 7. Lymtal International Inc. Lake Orion, MI (Lymtal).
 8. MM Systems Corporation, Atlanta, GA (MM).
 9. TechStar, Inc., Findlay, OH (TechStar).
 10. Tremco, Cleveland, OH (Tremco).
 11. Watson Bowman Acme Corporation, a Division of BASF Construction Chemicals NA, Amherst, NY (WBA).

2.4 PRODUCTS, STANDARD EXPANSION JOINT SYSTEMS

- A. Elastomeric concrete edged, extruded rubber expansion joint system.
1. CR Series System, Jointmaster.
 2. DuraFlex Chambered Wing Seal CS and DCS Series, Balco.
 3. Iso-Flex Winged Joint System J Series, LymTal.
 4. Lokcrete Membrane System (LMS) Series, MM.
 5. Polycrete/Membrane System, Type CR Series, EMS.
 6. Thermaflex Membrane/Nosing System, Type TM and TCR Series, Emseal.
 7. Vulkem WF series Vehicular Expansion Joint System, Tremco.
 8. Wabo®Crete Membrane System ME Series, WBA.
- B. Substitutions: **None** for this project. Contact Engineer/Architect for consideration for future projects.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and blockouts where expansion joint systems will be installed for installation tolerances and other conditions affecting performance of Work.
1. Contractor responsible to ensure expansion joint manufacturer reviews and approves blockout conditions prior to expansion joint installation (including blockout repair methods and procedures).

- B. Check elevations on each side of expansion joint gap to ensure flush slab-to-slab transition.
- C. Check anticipated or actual minimum and maximum joint openings. Compare to manufacturer's movement specifications and make joint sizing recommendations.
- D. Coordinate and verify that related Work meets following requirements:
 - 1. Check adhesion to substrates and recommend appropriate preparatory measures.
 - 2. Curing compounds used on concrete surfaces are compatible with Work to be installed.
 - 3. Concrete surfaces have completed proper curing period for system selected.
 - 4. Coordinate expansion joint system with other related Work before installation of expansion joint.
 - 5. Verify expansion joints are compatible with Joint Sealants and traffic toppings.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.
- F. Cease installation if expansion joint blockouts and/or openings exhibit cracked edges, voids or spalls. Repair with approved material prior to installation of expansion joint.
- G. Correct unsatisfactory conditions in manner acceptable to Manufacturer and Engineer before installing joint system.

3.2 PREPARATION

- A. Prepare for installation of expansion joint systems in accordance with manufacturer's recommendations.
- B. Surface Preparation:
 - 1. Acid etching: Prohibited.
 - 2. Prepare substrates according to joint system manufacturer's written instructions.
 - 3. Clean joints thoroughly in accordance with manufacturer's instructions to remove all laitance, unsound concrete and curing compounds which may interfere with adhesion.

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing joint assemblies and materials unless more stringent requirements are indicated.
- B. Proceed with work only when existing and forecast weather and temperature of concrete substrate will permit work in accordance with manufacturer's recommendations.
- C. Cease material installation under adverse weather conditions, or when temperatures are outside manufacturers recommended limitations for installation, or when temperature of work area or substrate are below 40 deg F.

- D. Terminate exposed ends of joint assemblies with field- or factory-fabricated termination devices.
- E. Seal all openings to occupied spaces to prevent cleaning materials, solvents, and fumes from infiltration. All protective measures and/or ventilating systems required to prevent infiltration are incidental to this Work.
- F. Clean off excess material and material smears adjacent to joints as work progresses using methods and materials approved by manufacturer.

3.4 FIELD QUALITY CONTROL

- A. Field Tests and Inspections: Prior to opening to traffic, test joint seal for leaks by maintaining continuously wet for 12 hours. Repair leaks revealed by examination of seal underside. **Repeat test and repairs until all leaks stopped.**
- B. Manufacturer Services: Provide qualified manufacturer's technical representative for periodic inspection of Work at critical time of the installation including, but not limited to: pre-concrete formwork and placement site meetings, block out inspection, surface defect repair, surface preparation, metal work, expansion gland installation and waterproofing system installation.

3.5 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over joints. Reinstall cover plates or seals prior to Substantial Completion of Work.

END OF SECTION 079500

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SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

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

1.2 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following exterior substrates:

W.I. 45.4 "Paint Concrete Beams & Walls" (Alternate) – (PS#4)

- 1. Previously-painted and/or un-painted surfaces of concrete walls and beams.

W.I. 45.5 "Paint Steel Connections" (Alternate) – (PS#4)

- 1. Exposed steel connections between concrete columns and precast panels.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) 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.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
- E. Evidence of applicator's being certified by manufacturer.

1.4 QUALITY ASSURANCE

A. Standards:

1. Preparation and Workmanship: Comply with manufacturer's written instructions and recommendations in "MPI Maintenance Repainting Manual" applicable to substrates and paint systems indicated.
2. Final approval of color selections will be based on benchmark samples.
 - a. Colors to be selected by Owner from full range of contractor/manufacturer-provided samples.
 - b. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Owner at no added cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
1. Product name or title of material.
 2. Product description (generic classification or binder type).
 3. Manufacturer's stock number and date of manufacture.
 4. Contents by volume, for pigment, and vehicle constituents.
 5. Thinning instructions.
 6. Application instructions.
 7. Color name and number.
 8. VOC content.
- B. 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 PROJECT 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 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.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional gallon of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products listed in the following sections by one of the following:
 - 1. Tnemec.
 - 2. Carboline.
 - 3. Sherwin-Williams.
 - 4. Engineer-approved equivalent.

2.2 PAINT, GENERAL

- A. 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.
- B. Colors: As noted on page 2 of this Section, note 1.4A.
- C. Finish (provide mockups of different finishes for Owner selection).
- D. See Section 3 – Execution for schedule of paint systems to be used on this project.

PART 3 - EXECUTION

- A. Mockups:
 - 1. **Provide Mockups for each type of paint and substrate combination. Obtain Owner/Engineer approval of surface preparation and finished painting work product for all applicable combinations of substrate, surface preparation procedures, and paint products, colors, and finishes prior to proceeding with Work. Install additional mockups as needed to obtain approval.**

B. Metal Content Testing Results:

1. No previous testing of existing paint materials for hazardous metal content has been completed or is available.

3.2 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. Remove all debonded coatings. Remove all laitance and surface contaminants, including oil, grease, and dirt as specified by manufacturer's written recommendations.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.
- E. **Pre-construction Paint Testing:** Testing of existing paint materials for lead or other hazardous materials content has **not** been conducted. Testing of existing paint for lead content and other hazardous materials content is responsibility of Contractor and is incidental to this project.

3.3 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Provide mockups of surface preparation procedures for Owner/Engineer approval.
- C. Remove plates, machined surfaces, and similar items already in place that 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 re-install items that were removed. Remove surface-applied protection.
 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- D. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and re-prime substrate with compatible primers as required to produce paint systems indicated.
- E. Remove all failed existing coatings, dirt, grease, and material that could inhibit bond of new over-coat paint materials.
- F. Perform surface preparation to all surfaces/substrates as outlined elsewhere in this specification document. Containment, collection, and disposal of all preparation debris shall be responsibility of Contractor. Submit plan to Owner/Engineer prior to start of Work. Minimum requirements include:
 1. Provide containment and collection procedures to not affect nearby vehicles, patrons, or other operational areas.
 2. Contain and/or collect preparation debris and dispose of in manner acceptable to Owner/Engineer. Preparation debris shall not be allowed into existing drainage system (including storm drains). Install filter fabric as minimum to protect existing drainage system.
 3. Protect all adjacent surfaces outside the scope of painting/preparation work. Repair any damage to Owner's satisfaction at no additional cost.
- G. Transitions between different layers of substrates/coatings shall be mechanically feathered together to provide a sound and tight transition for over-coating.
- H. All surfaces shall receive a 3,000-psi power wash with a paint manufacturer-approved and Owner-approved bio-degradable detergent to remove all "chalking", dirt, grease, and material that could inhibit bond of new paint materials. After power-washing, all surfaces shall be thoroughly rinsed to remove all remaining detergent residue and contaminants.
 1. Contractor to confirm power-washing procedure does not cause damage prior to proceeding with full-scale operation. Adjust pressure as needed to effectively clean/prepare surfaces without causing damage (incidental). Do not use high-pressured power washers (3,000 psi and above) without prior approval.
 2. Power washing shall not be used near elevator towers. Solvent cleaning and power tool cleaning/abrading shall be utilized in lieu of power washing. Protect elevator towers from dust/debris and water entering into shaft.
- I. Remove rust and loose mill scale by preparing according to SSPC-SP2 "Hand Tool Cleaning" to provide a mechanically abraded / profiled surface to promote a mechanical bond.
- J. After mechanically preparing all areas, **all** surfaces shall be thoroughly rinsed to remove all remaining laitance to provide suitable final substrate for painting. Comply with manufacturer's written requirements.
- K. Boundaries between different layers of existing coatings and between existing coatings and bare steel shall be feathered together prior to application of primer paint materials.
- L. Provide barriers and containment as required by applicable regulations to contain all airborne debris.

3.4 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated. Application shall be by roller or brush - spray application NOT allowed.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces.
- B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- C. 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.

3.5 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
 - 1. Owner may engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform tests for compliance of paint materials 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 non-complying 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.

3.6 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 Owner/Engineer, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.7 EXTERIOR PAINTING SCHEDULE

- A. Minimum dry-film thicknesses (DFT) shall be verified with manufacturer's recommendations for each system.
- B. Submit color samples to Owner for final approval of paint color and finish.
- C. **Concrete (Alt. W.I. 45.4):** One epoxy top coat (5 mils DFT minimum), over one coat of epoxy primer (5 mils DFT minimum) where bare concrete occurs.
 - 1. Tnemec:
 - a. Topcoat: 113 Tuf-coat Epoxy
 - b. Primer (over prepared bare concrete): 113 Tuf-coat Epoxy.
 - 2. Carboline:
 - a. Topcoat: Carboguard 60.
 - b. Primer (over prepared bare concrete): Carboguard 60.
 - 3. Sherwin Williams:
 - a. Topcoat: Macropoxy 646.
 - b. Primer (over prepared bare concrete): Macropoxy 646.
- D. **Steel (Alt. W.I. 45.5):** One polyurethane top coat (3 mils DFT minimum), over one epoxy mastic intermediate coat (5 mils DFT minimum), over prepared existing sound paint or one coat of epoxy mastic spot primer (5 mils DFT minimum) where prepared bare metal or marginal existing paint occurs.
 - 1. Tnemec:
 - a. Top Coat: EnduraShield 74 Polyurethane or UVX Series 750.
 - b. Intermediate Coat (over prepared existing sound paint or one coat of primer): 135 Chembuild.
 - c. Primer (over prepared bare metal): 135 Chembuild.
 - d. Sealer Primer: As recommended by Tnemec.
 - 2. Carboline:
 - a. Top Coat: Carbothane 133 LH.
 - b. Intermediate Coat (over prepared existing sound paint or one coat of primer): Carboguard 60.
 - c. Primer: Carboguard 60.
 - d. Sealer Primer: Rustbond.
 - 3. Sherwin-Williams:
 - a. Top Coat: Hi-Solids Polyurethane.

- b. Intermediate Coat (over prepared existing sound paint or one coat of primer): Macropoxy 646.
- c. Primer (over prepared bare metal): Macropoxy 646.
- d. Sealer Primer: Macropoxy 920 pre-prime.

END OF SECTION 099113

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SECTION 099121 - PAVEMENT MARKING - RESTORATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and application of high build paint systems of types, patterns, sizes, and colors to match existing and as described in this Section.
- B. Provide the following systems to match existing:
 - 1. Parking Stall Stripes.
 - 2. Traffic Arrows, crosswalks, accessible stall access aisles, walkways, symbols, stop bars, words and other markings.
 - 3. International Symbol of Accessibility.
- C. Provide painting of curbs and curb ramps to match existing. Contractor shall also paint curbs and curb ramps that are currently un-painted that occur within work areas.
 - 1. Paint vertical surface and the first 6 in. of the abutting horizontal surface at the top of curbs and islands (including PARCS equipment islands).
 - 2. Paint color for curbs and curb ramps shall be yellow.
- D. Proportion International Symbol of Accessibility in accordance with ICC A117.1-2009 Accessible and Usable Buildings or 2010 ADA Standards for Accessible Design.
- E. Related Work:
 - 1. Pavement Marking Contractor shall verify compatibility with sealers, coatings, joint sealants, caulking, curing compounds, and all other existing or new surface treatments.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Provide product data as follows:
 - 1. Manufacturer's certification that the material complies with standards referenced within this Section.
 - 2. Intended paint use.

3. Pigment type and content.
 4. Vehicle type and content.
- C. Submit list of similar projects (minimum of 5) where pavement-marking paint has been in use for a period of not less than 2 yrs.

1.4 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 degrees F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

1.5 QUALITY ASSURANCE

- A. Provide written 1 year warranty to Owner that pavement markings will be free of defects due to workmanship, inadequate surface preparation, and materials including, but not limited to: fading and/or loss of markings due to abrasion, peeling, bubbling and/or delamination. Excessive delamination, peeling, bubbling or abrasion loss shall be defined as more than 15% loss of marking material within one year of substantial completion. With no additional cost to Owner, repair and/or recoat all pavement marking where defects develop or appear during warranty period and all damage to other Work due to such defects.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pavement marking materials shall meet Federal, State, and Local environmental standards.
- B. Paint shall be manufactured and formulated from first grade raw materials and shall be free from defects or imperfections that might adversely affect product serviceability.
- C. Paints shall comply with the National Organic Compound Emission Standards for Architectural Coatings, Environmental Protection Agency, 40 CFR Part 59.
- D. The product shall not contain mercury, lead, hexavalent chromium, or halogenated solvents.

2.2 PAVEMENT MARKING PAINTS:

- A. 100% Acrylic Waterborne: Paint shall be used for white and yellow pavement markings and shall meet requirements of MPI #70.

1. Available Products: Subject to compliance with the requirements, products that may be incorporated into the Work include, but are not limited to:
 - a. Hi-Build Latex "Liquid Thermoplastic" Traffic & Zone Marking Paint, 5430/5431, by RAE Products & Chemicals Corporation
 - b. Setfast Acrylic Waterborne Marking Paint, TM 226/227 by Sherwin Williams Company.
 2. 100% acrylic waterborne paint for special color pavement markings (blue, green, red, black) shall meet requirements of Federal Specification TT-P-1952E. Special color marking materials shall be compatible with the white and yellow pavement markings where they are layered.
- B. All products shall have performance requirements of Type I and II of Federal Standard TT-P-1952E.

2.3 COLOR OF PAINT

- A. Color of paint shall match existing, unless directed otherwise by Owner/Engineer. Contractor shall submit striping plan for Owner/Engineer review/approval prior to starting this work.
1. White: Match federal color chip 37925 and daylight directional reflectance (without glass beads) shall not be less than 84% (relative to magnesium oxide) when tested in accordance with Federal Test Method Standard 141, Method 6121.
 2. Yellow: Match federal color chip No. 33538. Color shall have daylight directional reflectance (without glass beads) of not less than 50% (relative to magnesium oxide) when tested in accordance with Federal Test Method Standard 141, Method 6121.
 3. Blue: Match federal color chip No. 35180. Color shall have daylight directional reflectance (without glass beads) of not less than 52% (relative to magnesium oxide) when tested in accordance with Federal Test Method Standard 141, Method 6121.

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 work.
- B. Document the location of existing striping and traffic marking, and colors utilized prior to removal of traffic lines and markings for surface preparation.

- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.
- E. Striping shall not be placed until full cure of concrete repairs, sealers, coatings, sealants, etc.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Do not paint or finish any surface that is wet or damp.
- C. Clean substrates of substances that could impair bond of paints, including dirt, dust, oil, grease, release agents, curing compounds, efflorescence, chalk, and incompatible paints and encapsulants.
- D. Concrete Substrates: Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Lay out all striping on each tier, using existing layout, dimensions and details unless directed otherwise by Owner/Engineer.
- F. Report any discrepancies, interferences or changes in striping due to field conditions to Engineer/Architect prior to painting. Pavement Marking Contractor shall be required to remove paint, repair surface treatment and repaint stripes not applied in strict accordance with Contract Drawings.
- G. Where existing painted pavement markings and/or stripes conflict with new striping layout or must be removed due to installation which does not conform to contract requirements, remove existing paint markings, using care to avoid scarring substrate surface.
 - 1. Concrete and Asphalt Surfaces: Material shall be removed by methods acceptable to Engineer/Architect and cause as little damage as possible to surface texture of pavement. Methods that can provide acceptable results, are grinding and air or shot blasting. Use of chemicals to remove pavement markings prohibited. Collect residue generated by removal of pavement markings and dispose of as required by all applicable laws and regulations. If grinding is used, lightly grind floor surface using wheel mounted floor grinder or similar equipment with positive elevation control of grinder head. For all removal

techniques: On test area, demonstrate to Owner acceptable removal of paint material and control of paint removal equipment to prevent substrate scarring.

2. Traffic Topping/Membrane surfaces: Remove existing pavement markings by solvent washing or high-pressure water washing. Submit letter from traffic topping/membrane manufacturer certifying that solvents and/or water pressures are acceptable for this use and will not damage material. On test area, demonstrate to Owner acceptable removal of paint material and control of paint removal equipment to prevent substrate scarring.
3. Contractor shall not use paint, bituminous bond coat or other methods of covering markings to obliterate existing pavement markings.
4. Material deposited on pavement as a result of removal shall be removed as work progresses. Accumulation of material, that might interfere with drainage or might constitute a hazard to traffic, prohibited.
5. Curing compounds on new concrete surfaces (less than 1 yr old) shall be removed per existing pavement marking removal requirements prior to installation of new pavement markings.

H. Work Areas:

1. Store, mix and prepare paints only in areas designated by Contractor for that purpose.
2. Provide clean cans and buckets required for mixing paints and for receiving rags and other waste materials associated with painting. Clean buckets regularly. At close of each day's Work, remove used rags and other waste materials associated with painting.
3. Take precautions to prevent fire in or around painting materials. Provide and maintain appropriate hand fire extinguisher near paint storage and mixing area.

I. Mixing:

1. Do not intermix materials of different character or different manufacturer.
2. Do not thin material except as recommended by manufacturer.

J. Disposal:

1. Contractor shall properly dispose of unused materials and containers in compliance with Federal Resource Conservation Recovery Act (RCRA) of 1976 as amended, and all other applicable laws and regulations.

3.3 APPLICATION

- A. Apply painting and finishing materials in accordance with manufacturer's directions. Use applications and techniques best suited for material and surfaces to which applied. Minimum air shall be used to prevent overspray. Temperature during application shall be minimum of 40 deg F and rising, unless manufacturer requires higher minimum temperature. Maximum relative humidity shall be as required by manufacturer.

1. Total wet mil thickness of 0.015 in (minimum).
2. Total dry film thickness of 0.008 in (minimum).

- B. All lines shall be straight, true, and sharp without fuzzy edges, overspray or non-uniform application. Corners shall be at right angles with no overlaps. Line width shall be uniform (-0%, +5% from specified width). No excessive humping (more material in middle than at edges or vice versa).
- C. All lines shall be 4-inches wide unless otherwise noted.

END OF SECTION 099121

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