MICHIGAN STATE
UNIVERSITY

ELECTRONIC BIDDING

INVITATION ONLY
SPECIFICATION FOR

Parking Ramp 1 – Shaw Lane – Maintenance

PROJECT NUMBER

CP23098

Thursday, March 28, 2024

AT

MICHIGAN STATE UNIVERSITY
EAST LANSING, MICHIGAN

Infrastructure Planning and Facilities
Planning, Design and Construction

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SCHEDULE OF DRAWINGS

Project Title: **Parking Ramp 1 – Shaw Lane – Maintenance**
Capital Project Number: **CP23098**
No. of Sheets: **20**

ADVERTISEMENT FOR BIDS

DATE: **March 28, 2024**

PROJECT TITLE: **Parking Ramp 1 – Shaw Lane – Maintenance**

PROJECT NUMBER: **CP23098**

for

MICHIGAN STATE UNIVERSITY

located at

EAST LANSING, MICHIGAN

OWNER: BOARD OF TRUSTEES
MICHIGAN STATE UNIVERSITY

ENGINEER/ARCHITECT: PLANNING, DESIGN AND CONSTRUCTION
Infrastructure Planning and Facilities
Michigan State University

DESIGN REPRESENTATIVE: **Shelly Laughlin 517-930-4557**

PROJECT MANAGER: **Andy Linebaugh PHONE: 517-243-0029**

Walker Consultants
650 Trade Centre Way, Ste. 325
Portage, **MI 49002**

BID DUE DATE: Until **3:00 p.m.** on **Wednesday, April 24, 2024**, the Owner will receive bids for the work as set forth in the Bidding Documents at via the Owner's Oracle Primavera Unifier Bid Manager, at which time and place all proposals will be publicly opened. Bidders are responsible for properly registering for this process, and familiarizing themselves with the system and its requirements. Registration information can be found at https://ipf.msu.edu/construction/partners/prospective-partners.

Proposals are invited for the following work:
Proposal 1 – General Construction Work

This project involves but is not limited to, demolition, partial concrete floor and ceiling repair, concrete beam repair partial and full depth-PT, partial depth column repair, tendon-splice, expansion joint repair and replacement, crack and joint repair, miscellaneous shoring and reshores, floor surface protection sealer, traffic coatings, floor drain repair and replacement, mechanical piping and hangers and miscellaneous architectural, electrical, and mechanical.

Invitation Only: Bids will only be accepted by the following firms:

1. Bornor Restoration
2. D.C. Byers Co.
3. M One Limited
4. Pullman Services
5. RAM Construction

The substantial construction completion date for the project, as set forth in the project manual and drawings is **August 16, 2024**. See applicable start date and interim completion dates in the General Requirements (Division One) – Part 1 Work Sequence section.

LIQUIDATED DAMAGES:
☐ Shall, or ☒ Shall not be assessed for Substantial Completion at:
$_____PER DAY

☐ Shall, or ☒ Shall not be assessed for Final Completion at:
$_____PER DAY

EXCLUSIONS FROM MUTUAL WAIVERS OF CONSEQUENTIAL DAMAGES:
DEFAULT IS NONE. (If exclusions apply, project team to insert applicable exclusions below).

_____

The complete set of documents is also available for viewing through our new MSU Plan Room or via the MSU Planning, Design and Construction (PDC) web page at https://ipf.msu.edu/construction/partners/prospective-partners and then select “dedicated plan room”.

PLAN ROOMS

The Bidding documents are on file and may be examined at the following locations during regular business hours, Monday through Friday:

Builders Exchange of Lansing &
Central Michigan
1240 East Saginaw
Lansing, MI 48906

Dodge Data & Analytics
25330 Telegraph Road, Suite 350
Southfield, MI 48009

Dodge Data & Analytics
914 E. Vine Street
Kalamazoo, MI 49001

Dodge Data & Analytics
1311 South Linden Road, Suite B
Flint, MI 48532

Builders Exchange
P.O. Box 2031
Grand Rapids, MI 49501

Tri-City Builders & Traders Exchange
334 South Water
Saginaw, MI 48607

Construction Association of Michigan
43636 Woodward Avenue
P. O. Box 3204
Bloomfield Hills, MI 48302-3204

Builders Exchange
3431 East Kilgore
Kalamazoo, MI 49001

CNS Construction News Service
of West Michigan, Inc.
1793 R. W. Berends Dr. SW.
Wyoming, MI 49509-4993

MMSDC Michigan Minority Supplier
Development Council.
100 River Place STE 300
Detroit, MI 48207

Builders Exchange of NW MI, Inc.
1373 Barlow St. , Suite 4
Traverse City, MI 49686

Capital Imaging
2521 East Michigan Avenue
Lansing, MI 48912

A pre-bid site inspection will be held on **Thursday, April 04, 2024** at **2:00 p.m.**. All interested Contractors or Bidders are encouraged to attend. Interested parties should meet at the **Infrastructure Planning and Facilities, 1147 Chestnut Rd. – Rm 11, East Lansing, MI 48824**. All Contractors submitting bids for the work will be held to have visited the site prior to submitting bids.

Each proposal shall be accompanied by a bid security as set forth in the Instructions to Bidders.

The Owner reserves the right to reject any or all proposals either in whole or in part and to waive any irregularities.

Withdrawal of any proposal is prohibited for a period of 120 days after the actual date of the opening thereof.

Performance and Labor and Material Bonds are required as set forth in the Instructions to Bidders.

All prospective Bidders, their Subcontractors and suppliers must be awardable by and in compliance with the directives and guidelines of the Contract Compliance Division of the Michigan Civil Rights Commission.

SUBCONTRACTING AND SUPPLIER DIVERSITY

The University makes a continuous effort to broaden its business relationships with Minority Business Enterprise (MBE) contractors, Women Business Enterprise (WBE) contractors, and small business concerns (including veteran-owned small business, service-disabled veteran owned small business, HUB Zone small business, and small disadvantaged business concerns certified by the U.S. Small Business Administration). For the purposes of this provision, suppliers are considered subcontractors. If third parties are needed to fulfill contractual obligations to the University, you are strongly encouraged to consider all qualified sources, including WBE, MBE, and small business subcontractors. For purposes of this paragraph, MBE is defined as a business enterprise of which more than 50% of the voting shares or interest in the business is owned, controlled, and operated by individuals who are members of a minority and with respect to which more than 50% of the net profit or loss attributable to the business accrues to shareholders who are members of a minority. WBE is defined as a business enterprise of which more than 50% of the voting shares or interest in the business is owned, controlled, and operated by women and with respect to which more than 50% of the net profit or loss attributable to the business accrues to the women shareholders.

The apparent Low Bidder shall, within 24 hours, after receipt of bids, provide the names of any MBE/WBE/small business subcontractors, description of work to be done by each, dollar value of work, and percentage of contract price. This information shall be included with the contract breakdown specified in Section 012000.1.4 of the specifications.

The Michigan State University Purchasing Department maintains a list of known Minority and Women Business Enterprises in the region for informational purposes. Bidders can obtain a copy of this list by calling (517) 355-0357. This list is not intended to be comprehensive. Similarly, it does not constitute an endorsement or certification of acceptability of the contractors and vendors included.

INSTRUCTION TO BIDDERS

ARTICLE 1

DEFINITIONS

1.1 Bidding Documents include the Advertisement or Invitation to Bid, Instruction to Bidders, the Bid Form, other sample bidding and Contract forms and the proposed Contract Documents including any Addenda issued prior to receipt of Bids.

1.2 All definitions set forth in ConsensusDocs 200- Standard Agreement and General Conditions Between Owner and Constructor (as modified by MSU) and in other Contract Documents are applicable to the Bidding Documents.

1.3 **Addenda** are written or graphic instruments, issued by the Architect prior to the receipt of Bids, which modify or interpret the Bidding Documents by addition, deletions, clarifications or corrections.

1.4 A **Bid** is a complete and properly signed proposal to do the Work or designated portion thereof, for the sums stipulated therein, supported by data called for by the Bidding Documents.

1.5 **Base Bid** is the sum stated in the Bid for which the Bidder offers to perform the Work described as the base, to which Work may be added or deducted for sums stated in Alternate Bids.

1.6 An **Alternate Bid** (or Alternate) is an amount stated in the Proposal to be added to or deducted from the amount of the Base Bid if the corresponding change in project scope or materials or methods of construction described in the Bidding Documents is accepted.

1.7 A **Unit Price** is an amount stated in the Bid as a price per unit of measurement for materials or services as described in the Contract Documents.

1.8 A **Bidder** is one who submits a Bid for a prime Contract with the Owner for the Work described in the proposed Contract Documents.

1.9 A **Sub-bidder** is one who submits a Bid to a Bidder for materials or labor for a portion of the Work.

1.10 **Bid Manager** is the Oracle Primavera Unifier Bid Manager application used the by the Owner to received competitive bids for this project.

ARTICLE 2

BIDDER'S REPRESENTATION

2.1 Each Bidder, by making his/her Bid, represents that:

2.1.1 They have read and understand the Bidding Documents and their Bid is made in accordance therewith.

2.1.2 They have visited the site and are familiar with the local conditions under which the Work is to be performed.

2.1.3 Their Bid is based upon the materials, systems and equipment described in the Bidding Documents, without exceptions.

ARTICLE 3

BIDDING DOCUMENTS

3.1 COPIES

3.1.1 Bidders may obtain complete sets of the Bidding Documents via the MSU PLANNING, DESIGN AND CONSTRUCTION web page at https://ipf.msu.edu/construction/partners/prospective-partners, or as outlined in the Advertisement for Bids, page AB-2.

3.1.2 Complete sets of Bidding Documents shall be used in preparing Bids; neither the Owner nor the Architect assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

3.1.3 The Owner or Architect, in making copies of the Bidding Documents available on the above terms, does so only for the purpose of obtaining Bids on the Work and does not confer a license or grant for any other use.

3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

3.2.1 Bidders shall promptly notify the Architect of any ambiguity, inconsistency or error which they may discover upon examination of the Bidding Documents or of the site and local conditions.

3.2.2 Bidders requiring clarification or interpretation of the Bidding Documents shall make a written request to be received by the Architect at least fourteen days prior to the date for receipt of Bids.

3.2.3 Any interpretation, correction or change of the Bidding Documents will be made by Addendum. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon such interpretations, corrections and changes.

3.3 SUBSTITUTIONS

3.3.1 The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.

3.3.2 No substitution will be considered unless written request for approval has been submitted by the Bidder and has been received by the Architect at least fourteen days prior to the date for receipt of Bids. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including drawings, cuts, performance and test data, and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or work that incorporation of the substitute would require shall be included. It is the burden of the bidder proposing the substitution to establish its merits. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

3.3.3 If the Architect approves any proposed substitution, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

3.4 ADDENDA

3.4.1 The Architect and Owner will endeavor to notify all known plan holders of addenda issued, but it is the Bidder’s responsibility to verify receipt of all addenda.

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

3.4.3 Normally Addenda will not be issued later than five days prior to the date for receipt of Bids except an Addendum, if necessary, postponing the date for receipt of Bids or withdrawing the request for Bids.

3.4.4 Each Bidder shall ascertain prior to submitting their Bid that they have received all Addenda issued, and receipt of all Addenda shall be acknowledged on their bid.

ARTICLE 4

BIDDING PROCEDURE

4.1 FORM AND STYLE OF BIDS

4.1.1 Bids shall be submitted via the Bid Manager on the form specified.

4.1.2 All fields on the Bid Form shall be completed.

4.1.3 All requested Alternates shall be listed and quoted in the Bid Manager. Failure to quote a requested Alternate will be cause to reject the Bid.

4.1.3.1 If an alternate is added via Addendum, bidders will include by [adding new line to bid form, clearly labeling ALTERNATE X(x being the number)] or [providing pricing on an attachment, also clearly labeling pricing for Alternate.]

4.1.4 All requested Unit Prices shall be listed and quoted via attachment in the Bid Manager. Failure to quote a requested Unit Price will be cause to reject the Bid.

4.1.5 Acknowledge the receipt of the last Addendum on the Bid Form. By acknowledging this addendum, Bidder also acknowledges receipt of all prior consecutive addenda (e.g., acknowledging Addendum 3 also acknowledges Addendum 1 and 2).

4.1.6 Bidder shall make no additional stipulations on the Bid Form nor qualify its Bid in any manner.

4.1.7 By submitting a Bid via the Bid Manager, the Bidder has committed the offer to perform the Work. The Owner will rely on this document as properly signed by the Bidder. The Owner may rely on this commitment, including submitting a claim on the Bidder's Bid Bond if they fail to enter into a contract per the project manual.

4.2 BID SECURITY

4.2.1 Any base bid greater than $50,000 shall be accompanied by a Bid Security in the form of a bid bond made payable to the Board of Trustees, Michigan State University, in the amount of not less than five percent (5%) of the Base Bid, as a proposal guarantee, pledging that the Bidder will enter into a Contract with the Owner on the terms stated in its Bid, and will furnish bonds as described hereunder in Article 8 covering the faithful performance of the Contract and the payment of all obligations arising thereunder. Bidder shall attach a scanned copy of the bid bond to the bid in Unifier Bid Manager.

As an alternative to a bid bond, Bidders may provide certified check, cashiers' check, or money order made payable to the Board of Trustees, Michigan State University, in the amount of not less than five percent (5%) of the Base Bid, to be delivered to MSU Infrastructure Planning and Facilities, 1147 Chestnut Road, Room 101, East Lansing, MI 48824. The proposal guarantee of Bidders under consideration will be returned immediately after approval of contracts by the Owner; those of all others will normally be returned upon request within 48 hours after bid opening.

Should the Bidder refuse to enter into a Contract, or fail to furnish such bonds within 30 days of notification of intent to award, the amount of the Bid Security shall be forfeited to the Owner as liquidated damages, not as penalty.

4.2.2 The bonding firm must be listed on the current U.S. Department of Treasury Circular 570, rated A- or better by Best, and be licensed to do business in the State of Michigan. The bonds are to be made out to "Michigan State University, Board of Trustees."

4.2.3 The Owner will have the right to retain the Bid Security of Bidders under consideration until either (a) the Contract has been executed and bonds have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn, or (c) all Bids have been rejected.

4.3 SUBMISSION OF BIDS

4.3.1 Bids shall be completed prior to the time and date for receipt of Bids indicated in the Advertisement or Invitation to Bid, or any extension thereof made by Addendum. Bids received after the time and date for receipt of Bids will not be considered.

4.3.2 Bidder shall assume full responsibility for timely delivery at location designated for receipt of Bids.

4.3.3 Oral, telephone, paper, or faxed Bids are invalid and will not receive consideration.

4.4 MODIFICATION OR WITHDRAWAL OF BID

4.4.1 A Bid may not be modified, withdrawn, or canceled by the Bidder during the stipulated time period following the time and date designated for the receipt of Bids, and Bidder so agrees in submitting his/her Bid.

4.4.2 Prior to the time and date designated for receipt of Bids, Bids submitted early may be modified or withdrawn only by withdrawing current Bid, and resubmitting within the Bid Manager.

4.4.3 Bid security shall be in an amount sufficient for the Bid as modified or resubmitted.

4.5 BIDDER REGISTRATION

4.5.1 The Owner will only receive Bids via the Bid Manager, which requires prior registration and invitation. The Bidder is responsible to familiarize itself with this system and request access in a timely manner.

4.5.2 The Owner will endeavor to maintain a list of all interested bidders, and invite to all public bids. Bidders interested in being added to this list must register. Registration information can be found at https://ipf.msu.edu/construction/partners/prospective-partners.

4.5.3 Bidders are encouraged to continue to monitor projects via plan rooms and other advertising venues. They must express interest to bid on MSU projects by request at least 7 days prior to a bid opening. Owner takes no responsibility for inviting a bidder after that date.

ARTICLE 5

CONSIDERATION OF BIDS

5.1 OPENING OF BIDS

5.1.1 Unless stated otherwise in the Advertisement or Invitation to Bid, the properly identified Bids received on time will be opened publicly and will be read aloud. Opening will generally take place in MSU Infrastructure Planning and Facilities Building, 1147 Chestnut Road, East Lansing, Michigan 48824.

5.1.1.1 Unless stated otherwise in the Advertisement or Invitation to Bid, the Owner will endeavor to share bid results within 24 hours of opening.

5.1.1.2 The Owner will endeavor to stream the bid opening, and will share details in the bid invitation

5.2 REJECTION OF BIDS

5.2.1 The Owner shall have the right to reject any or all Bids.

5.3 ACCEPTANCE OF BID (AWARD)

5.3.1 The Owner shall have the right to waive any informality or irregularity in any Bid received.

5.3.2 If the University accepts any alternates, it will do so in the order representing the Owner's opinion of the best value to Michigan State University. The Owner shall be the sole judge of value. The low bidder will be determined on the basis of the sum of the base bid and the alternates accepted.

5.4 ACCEPTANCE OF CONTRACTOR AND SUBCONTRACTORS

5.4.1 Each portion of the Work shall be performed by an organization equipped and experienced to do the Work in each particular field, and no portion shall be reserved by the Contractor unless they are so equipped and experienced. Within 24 hours after the receipt of Bids, the successful Contractor shall submit a list of each Subcontractor proposed for each section of the Work. Subcontractors shall be satisfactory to the Owner. Unless authorized to the contrary in writing from the Owner, Subcontracts shall be awarded to the firms named in this list. Acceptance of the Bid does not imply approval of the Subcontractors subsequently named, but each Subcontractor shall be approved individually.

ARTICLE 6

QUALIFICATION OF CONTRACTORS

6.1 SUBMISSION OF QUALIFICATION STATEMENT

6.1.1 Bidders to whom award of a Contract is under consideration shall submit to the Architect upon his/her request, a properly executed Contractor's Qualification Statement, Consensus Docs 221 – Constructor's Statement of Qualifications for a Specific Project, unless such a Statement has been previously required and submitted as a prerequisite to the issuance of Bidding Documents.

6.2 NONDISCRIMINATION

6.2.1 In performing under this Contract, the Contractor agrees not to discriminate against any employee, or applicant for employment, with respect to hire, tenure, terms, conditions or privileges of employment, or any matter directly or indirectly related to employment, because of race, color, religion, national origin, age, sex, height or weight, marital status or handicap. Subcontracts with each Subcontractor will contain a provision requiring nondiscrimination in employment, as herein specified. Any breach of this covenant may be regarded as a material breach of this Contract. The foregoing is included as a part of the University's institutional Affirmative Action/Equal Opportunity commitment.

6.3 APPROVED ASBESTOS ABATEMENT CONTRACTORS

6.3.1 The Department of Environmental Health and Safety (EHS) annually prequalifies asbestos abatement contractors to perform asbestos abatement work on Campus. Asbestos abatement work shall only be performed by one of the asbestos abatement contractors on the approved list. The current list is available from the PDC Project Representative, the Environmental Coordinator for EHS, and at https://ehs.msu.edu/enviro/asbestos/index.html.

ARTICLE 7

POST-BID INFORMATION

7.1 SUBMISSIONS

7.1.1 Unless waived by the Architect, the apparent low Bidder shall, within 24 hours after receipt of bids, submit the following information to the Architect:

7.1.1.1 A designation of the Work to be performed by the Bidder with their own forces.

7.1.1.2 The proprietary names and the suppliers of principal items or systems of material and equipment proposed for the Work.

7.1.1.3 A list of names of the Subcontractors or other persons or organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for each division and/or major subdivision, for the Owner’s approval.

7.1.1.4 The names of the MBE/WBE and a description of work to be done by each, dollar value of Work and percentage of Contract price.

7.1.1.5 List of representatives authorized to perform Unifier functions on behalf of the contractor using the Unifier New Company Request, available at Unifier System Vendor Information Form.

7.1.1.6 Certificate of Insurance demonstrating compliance with project requirements.

7.1.2 At the option of the Owner, the Bidder may be required to establish to the satisfaction of the Architect and the Owner the capability, reliability, and responsibility of the proposed Contractor and Subcontractors to furnish and perform the Work.

7.1.3 Subcontractors and other persons and organizations proposed by the Bidder and accepted by the Owner and the Architect must be used on the Work for which they were proposed and accepted and shall not be changed except with the written approval of the Owner and the Architect.

ARTICLE 8

PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

8.1 OWNER'S RIGHT TO REQUIRE BONDS

8.1.1 Each Bidder under a proposal in which the base bid exceeds $50,000, shall include the premiums for furnishing a Performance Bond and also Labor Material Bond, each in the full amount of the proposal sum as specified in the Owner / Constructor Agreement.

8.1.2 The bonding firm must be listed on the current U.S. Department of Treasury Circular 570, rated A- or better by Best, and be licensed to do business in the State of Michigan. The bonds are to be made out to "Michigan State University, Board of Trustees."

8.1.3 In assuming assigned Subcontractor by the successful Bidder for general building work as specified, each assigned Subcontractor for each Subcontract shall reimburse the General Contractor his/her proportionate share of the premiums for bonds.

8.2 TIME OF DELIVERY AND FORM OF BONDS AND INSURANCE

8.2.1 The Bidder shall deliver two (2) copies of the required bonds and insurance to the Owner not later than the date of execution of the Contract.

8.2.2 The Bidder shall require the Attorney-In-Fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of his/her Power of Attorney.

ARTICLE 9

FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

9.1 FORM TO BE USED

9.1.1 The Agreement for the Work will be governed by the project manual, and by the terms and conditions of ConsensusDocs 200- Standard Agreement and General Conditions Between Owner and Constructor (as modified by MSU).

9.1.2 If the project is under $250,000, an MSU Purchase Order will be used and the terms and conditions of ConsensusDocs 200- Standard Agreement and General Conditions Between Owner and Constructor (as modified by MSU), will serve as the applicable General Conditions for administration of the Work.

9.1.3 If the project is over $250,000, the ConsensusDocs 200- Standard Agreement and General Conditions Between Owner and Constructor will be used and the terms and conditions of that Agreement will be formalized through the execution of a Contract Finalization Form.

ARTICLE 10

APPLICATION FOR PAYMENT

10.1 FORM TO BE USED

10.1.1 Applications for Payment shall be submitted in Unifier in accordance with the Pay Apps (Pay Applications) business process. Refer to the MSU IPF website for more information

ARTICLE 11

ELECTRONIC TRANSACTIONS

11.1 UNIFIER

11.1.1 The Owner reserves the right to require that any or all transactions and submissions be conducted and delivered electronically through Unifier, a web-based project management software system. Unifier functions on most popular web browsers. If the owner requires the use of Unifier, the owner will provide the necessary licenses for access into Unifier and the initial training necessary to use Unifier. Access to Unifier will be password restricted, and any proposal, acceptance, quote or other information submitted through Unifier through the use of a party's password shall be deemed to be the submission of such party and any proposal, acceptance, quote or other information in the submission shall be binding on such party as if such proposal, acceptance, quote or other information was in a writing signed by such party. Owner shall not be required to verify the validity of any such submission or inquire as to the authority of the user gaining access to Unifier through the use of a party's password. The following are the minimum Unifier user software and hardware requirements. It is the responsibility of the vendor to verify compatibility of their systems with Unifier. For more information, see Unifier System Vendor Information Form.

11.2 CONTRACT EXECUTION

11.2.1 The Owner may choose to accept a scanned signed contract, provided through Unifier, as acceptance of the agreement. The Owner will rely on this document as properly signed by the Constructor.

State of Michigan

WHPWRequest@michigan.gov

General Request No.: 544
Requestor:
Project Description:
Project Number:

Statewide County

Commercial Prevailing Wage Rates

GENERAL INFORMATION

Classification Name	Description	Straight Hourly	Time and a Half	Double Time	Overtime Provision
A Operator (0-6 months)	IBEW 876 & IBEW 17 - Teledata	$38.27	$52.09	$65.91	H H H X X X X D Y
	Apprentice Rates:				
	Lineman (6th - 6 months)	$35.61	$49.90	$64.18	
	Lineman (5th - 6 months)	$33.06	$46.07	$59.08	
	Lineman (4th - 6 months)	$30.53	$42.27	$54.02	
	Lineman (3rd - 6 months)	$27.99	$38.47	$48.94	
	Lineman (2nd - 6 months)	$25.45	$34.66	$43.86	
	Lineman (1st - 6 months)	$22.91	$30.85	$38.78	
A Operator (7-12 months)	IBEW 876 & IBEW 17 - Teledata	$40.95	$55.96	$70.96	H H H X X X X D Y
	Apprentice Rates:				
	Lineman (6th - 6 months)	$35.61	$49.90	$64.18	
	Lineman (5th - 6 months)	$33.06	$46.07	$59.08	
	Lineman (4th - 6 months)	$30.53	$42.27	$54.02	
	Lineman (3rd - 6 months)	$27.99	$38.47	$48.94	
	Lineman (2nd - 6 months)	$25.45	$34.66	$43.86	
	Lineman (1st - 6 months)	$22.91	$30.85	$38.78	

GENERAL INFORMATION

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
A Operator (over 1 yr)	IBEW 876 & IBEW 17 - Teledata	$45.81	$62.97	$80.12	H H H X X X X D Y
	Apprentice Rates:				
	Lineman (6th - 6 months)	$35.61	$49.90	$64.18	
	Lineman (5th - 6 months)	$33.06	$46.07	$59.08	
	Lineman (4th - 6 months)	$30.53	$42.27	$54.02	
	Lineman (3rd - 6 months)	$27.99	$38.47	$48.94	
	Lineman (2nd - 6 months)	$25.45	$34.66	$43.86	
	Lineman (1st - 6 months)	$22.91	$30.85	$38.78	
B Operator (0-6 months)	IBEW 876 & IBEW 17 - Teledata	$34.25	$46.29	$58.33	H H H X x X X D Y
	Apprentice Rates:				
	Lineman (6th - 6 months)	$35.61	$49.90	$64.18	
	Lineman (5th - 6 months)	$33.06	$46.07	$59.08	
	Lineman (4th - 6 months)	$30.53	$42.27	$54.02	
	Lineman (3rd - 6 months)	$27.99	$38.47	$48.94	
	Lineman (2nd - 6 months)	$25.45	$34.66	$43.86	
	Lineman (1st - 6 months)	$22.91	$30.85	$38.78	
B Operator (over 6 months)	IBEW 876 & IBEW 17 - Teledata	$39.35	$53.65	$67.94	H H H X X X X D Y
	Apprentice Rates:				
	Lineman (6th - 6 months)	$35.61	$49.90	$64.18	
	Lineman (5th - 6 months)	$33.06	$46.07	$59.08	
	Lineman (4th - 6 months)	$30.53	$42.27	$54.02	
	Lineman (3rd - 6 months)	$27.99	$38.47	$48.94	
	Lineman (2nd - 6 months)	$25.45	$34.66	$43.86	
	Lineman (1st - 6 months)	$22.91	$30.85	$38.78	

GENERAL INFORMATION

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Boilermaker					
Boilermaker	BO169	$72.47	$107.55	$142.63	H H H H H H H D Y
	Apprentice Rates:				
	1st Period	$53.53	$79.15	$104.75	
	2nd Period	$55.14	$81.56	$107.97	
	3rd Period	$56.73	$83.94	$111.15	
	4th Period	$58.31	$86.31	$114.31	
	5th Period	$59.85	$88.62	$117.39	
	6th Period	$63.03	$93.39	$123.75	
	7th Period	$66.17	$98.10	$130.03	
	8th Period	$69.32	$102.83	$136.33	
Bricklayer					
Brick Masonry, Stone Masonry, Artificial Masonry	BR2-31-BS	$53.52	$67.86	$82.19	H H H H H H H D N
	Apprentice Rates:				
	0-749 hours	$42.05	$50.65	$59.25	
	750-1,499 hours	$43.49	$52.81	$62.13	
	1,500-2,249 hours	$44.92	$54.95	$64.99	
	2,250-2,999 hours	$46.35	$57.10	$67.85	
	3,000-3,749 hours	$47.79	$59.26	$70.73	
	3,750-4,499	$49.22	$61.41	$73.59	
	4,500-5,249 hours	$50.65	$63.55	$76.45	
	5,250 hours	$52.09	$65.71	$79.33	
Pointing, Caulking and Cleaning	BR2-31-PCC	$53.52	$67.86	$82.19	H H H H H H H D N
	Apprentice Rates:				
	0-749 hours	$43.49	$52.81	$62.13	
	750-1,499 hours	$44.92	$54.95	$64.99	
	1,500- 2,249 hours	$46.35	$57.10	$67.85	
	2.250 -2,999 hours	$47.79	$59.26	$70.73	
	3,000-3,749 hours	$24.37	$36.56	$48.74	
	3,750-4,499 hours	$50.65	$63.55	$76.45	
	4,500 hours	$53.52	$67.85	$82.19	

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Cable spicer or COE foreman					
	IBEW 876 & IBEW 17 - Teledata	$42.53	$58.24	$73.94	H H H X X X X D Y
	Apprentice Rates:				
	Lineman (6th - 6 months)	$35.61	$49.90	$64.18	
	Lineman (5th - 6 months)	$33.06	$46.07	$59.08	
	Lineman (4th - 6 months)	$30.53	$42.27	$54.02	
	Lineman (3rd - 6 months)	$27.99	$38.47	$48.94	
	Lineman (2nd - 6 months)	$25.45	$34.66	$43.86	
	Lineman (1st - 6 months)	$22.91	$30.85	$38.78	
Cable spicer, Central Office Employee					
	IBEW 876 & IBEW 17 - Teledata	$40.71	$55.61	$70.51	H H H X X X X D Y
	Apprentice Rates:				
	Lineman (6th - 6 months)	$35.61	$49.90	$64.18	
	Lineman (5th - 6 months)	$33.06	$46.07	$59.08	
	Lineman (4th - 6 months)	$30.53	$42.27	$54.02	
	Lineman (3rd - 6 months)	$27.99	$38.47	$48.94	
	Lineman (2nd - 6 months)	$25.45	$34.66	$43.86	
	Lineman (1st - 6 months)	$22.91	$30.85	$38.78	
Carpenter					
Resilient floorlayer	CA1004FL	$49.49	$64.19	$78.89	X X H H H H H D N
	Apprentice Rates:				
	1st Year	$38.95	$48.46	$57.97	
	2nd Year	$40.31	$50.50	$60.69	
	3rd Year	$43.02	$54.57	$66.11	
	4th Year	$45.74	$58.65	$71.55	
Carpenter	CA1004L	$50.82	$65.79	$80.75	X X H H H H H D N
	Apprentice Rates:				
	1st Year	$41.84	$52.32	$62.79	
	2nd Year	$43.34	$54.57	$65.79	
	3rd Year	$46.33	$59.05	$71.77	
	4th Year	$49.32	$63.54	$77.75	

GENERAL INFORMATION

Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Cell Tower Tech						
		IBEW 876 & IBEW 17 - Teledata	$38.78	$52.83	$66.87	H H H X X X X D Y
	Apprentice Rates:					
	Lineman (6th - 6 months)		$35.61	$49.90	$64.18	
	Lineman (5th - 6 months)		$33.06	$46.07	$59.08	
	Lineman (4th - 6 months)		$30.53	$42.27	$54.02	
	Lineman (3rd - 6 months)		$27.99	$38.47	$48.94	
	Lineman (2nd - 6 months)		$25.45	$34.66	$43.86	
	Lineman (1st - 6 months)		$22.91	$30.85	$38.78	
Cement Mason						
Cement Mason		BR2-31-CM	$47.16	$60.76	$74.36	X H H H H H H D N
	Apprentice Rates:					
	0-749 hours		$37.64	$46.48	$55.32	
	750-1,499 hours		$39.00	$48.52	$58.04	
	1,500-2,249 hours		$40.36	$50.56	$60.76	
	2,250-2,999 hours		$41.72	$52.60	$63.48	
	3,000-3,749 hours		$43.08	$54.64	$66.20	
	3,750-4,499 hours		$44.44	$56.68	$68.92	
	4,500 hours		$47.16	$60.76	$74.36	
Cement Mason		CE514-L	$47.09	$61.77	$76.45	H H H H H H H D Y
	Apprentice Rates:					
	1st Year		$36.81	$46.35	$55.89	
	2nd Year		$39.75	$50.76	$61.77	
	3rd Year		$42.69	$55.17	$67.65	
Communication Technician						
		IBEW 876 & IBEW 17 - Roadway	$67.89	$98.24	$128.58	H H H H H H H D Y

GENERAL INFORMATION

Classification Name / Description			Straight Hourly	Time and a Half	Double Time	Overtime Provision
Drywall						
Drywall Taper and Finisher		PT-845-DF	$44.64	$58.17	$71.75	H H H H H H H D N
	Apprentice Rates:					
	1st level		$31.06	$37.80	$44.59	
	2nd level		$36.49	$45.95	$55.45	
	3rd level		$41.92	$54.09	$66.31	
Electrician						
Inside wireman		EC-252-IW	$77.98	$100.47	$122.96	H H D H D D D D N
	Apprentice Rates:					
	1st Period		$44.21	$51.51	$59.94	
	2nd Period		$50.44	$62.70	$74.95	
	3rd Period		$55.95	$69.44	$82.94	
	4th Period		$61.46	$77.21	$92.95	
	5th Period		$66.96	$84.95	$102.94	
	6th Period		$72.47	$92.71	$112.95	
Subdivision of county	Townships of Onondaga, Leslie, Stockbridge and Bunker Hill ONLY.					
Sound and Communications Installer Technician BICSI certified & 6,000 OJT Straight time Rate $54.32 Time and Half $73.16 Double Time $91.99		EC-252-SC	$51.10	$66.96	$83.79	H H D H D D D D N
	Apprentice Rates:					
	Period 1		$33.56	$40.49	$48.72	
	Period 2		$35.31	$43.02	$52.07	
	Period 3		$37.07	$45.56	$55.43	
	Period 4		$38.82	$48.11	$58.80	
	Period 5		$40.57	$50.63	$62.14	
	Period 6		$44.09	$55.70	$68.85	
	Period 7		$47.59	$60.76	$75.56	
	Period 8		$49.34	$63.29	$78.92	
	Technician BICSI certification & 6,000 OJT		$54.32	$73.16	$91.99	
Subdivision of county	Onondaga, Leslie, Stockbridge & Bunker Hill townships					

GENERAL INFORMATION

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Inside Wireman	EC-665-IW	$69.20	$89.45	$109.70	H H D H H H D D Y
Apprentice Rates:					
1st Period		$27.98	$36.52	$45.06	
2nd period		$30.12	$39.72	$49.34	
3rd Period		$34.37	$45.05	$55.73	
4th Period		$49.01	$62.90	$76.79	
5th Period		$51.14	$66.10	$81.05	
6th Period		$53.28	$69.31	$85.33	
Subdivision of county	Lansing, Meridian, Williamston, Locke, Delhi, Alaiedon, Wheatfield, Leroy, Aurelius, Vevay, Ingham, & White Oak townships				
Sound and Communication Journeyman a 4 day schedule of ten hours a day is allowed Monday thru Friday.	EC-665-SD	$66.56	$86.06	$105.56	H H D H H H D D Y
Apprentice Rates:					
1st period		$26.80	$35.03	$43.26	
2nd period		$28.86	$38.11	$47.37	
3rd period		$32.98	$43.26	$53.55	
4th period		$47.07	$60.45	$73.82	
5th period		$49.13	$63.53	$77.94	
6th period		$51.19	$66.63	$82.05	
Subdivision of county	Lansing, Meridian, Williamston, Locke, Delhi, Alaiedon, Wheatfield, Leroy, Aurelius, Vevay, Ingham and White Oak townships				
Elevator Constructor					
Elevator Constructor Mechanic	EL-85	$96.72		$152.57	D D D D D D D D Y
Apprentice Rates:					
1st year		$68.96		$99.68	
2nd year		$74.88		$111.18	
3rd year		$77.85		$116.95	
4th year		$84.65		$129.33	

GENERAL INFORMATION

Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Equipment Operator (line truck & man lifts)						
		IBEW 876 & IBEW 17 - Teledata	$38.78	$52.83	$66.87	H H H X X X X D Y
	Apprentice Rates:					
	Lineman (6th - 6 months)		$35.61	$49.90	$64.18	
	Lineman (5th - 6 months)		$33.06	$46.07	$59.08	
	Lineman (4th - 6 months)		$30.53	$42.27	$54.02	
	Lineman (3rd - 6 months)		$27.99	$38.47	$48.94	
	Lineman (2nd - 6 months)		$25.45	$34.66	$43.86	
	Lineman (1st - 6 months)		$22.91	$30.85	$38.78	
Fiber Optic Splicer						
		IBEW 876 & IBEW 17 - Roadway	$67.89	$98.24	$128.58	H H H H H H H D Y
Foreman						
		IBEW 876 & IBEW 17 - Roadway	$75.47	$109.61	$143.74	H H H H H H H D Y
In charge of three man crew		IBEW 876 & IBEW 17 - Teledata	$40.71	$55.61	$70.51	H H H X X X X D Y
	Apprentice Rates:					
	Lineman (6th - 6 months)		$35.61	$49.90	$64.18	
	Lineman (5th - 6 months)		$33.06	$46.07	$59.08	
	Lineman (4th - 6 months)		$30.53	$42.27	$54.02	
	Lineman (3rd - 6 months)		$27.99	$38.47	$48.94	
	Lineman (2nd - 6 months)		$25.45	$34.66	$43.86	
	Lineman (1st - 6 months)		$22.91	$30.85	$38.78	
	Apprentice Rates:					
	Lineman (6th - 6 months)		$35.61	$49.90	$64.18	
	Lineman (5th - 6 months)		$33.06	$46.07	$59.08	
	Lineman (4th - 6 months)		$30.53	$42.27	$54.02	
	Lineman (3rd - 6 months)		$27.99	$38.47	$48.94	
	Lineman (2nd - 6 months)		$25.45	$34.66	$43.86	
	Lineman (1st - 6 months)		$22.91	$30.85	$38.78	

GENERAL INFORMATION

Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Glazier						
Glazier	4 tens allowed on consecutive days	GL-826	$49.84	$67.73	$85.62	H H H H H H H D Y
	Apprentice Rates:					
	1st level		$31.62	$40.40	$49.18	
	2nd level		$35.12	$45.66	$56.18	
	3rd Level		$40.38	$53.54	$66.70	
	4th level		$45.66	$61.46	$77.26	
Heat and Frost Insulator						
Spray Insulation		AS25S	$25.29	$36.51	$47.73	X X X H H H H H N
Heat and Frost Insulator and Asbestos Worker						
Heat and Frost Insulators and Asbestos Workers		AS47	$52.00	$68.89	$85.77	X X X H H H H D Y
	Apprentice Rates:					
	1st year		$26.38	$33.69	$40.99	
	2nd year		$30.15	$38.92	$47.68	
	3rd year		$33.92	$44.15	$54.37	
	4th year		$37.70	$49.39	$61.08	
	5th year		$41.48	$54.63	$67.78	
IBEW 252						
Installor Technician		EC-252-sc				H H H D N
	Apprentice Rates:					
	Period 1		$33.56	$40.49	$48.72	
	Period 2		$35.31	$43.02	$52.07	
	Period 3		$37.07	$45.56	$55.43	
	Period 4		$38.82	$48.11	$58.80	
	Period 5		$40.57	$50.63	$62.14	
	Period 6		$44.09	$55.70	$68.85	
	Period 7		$47.59	$60.76	$75.56	
	Period 8		$49.34	$63.29	$78.92	
	Technician BICSI certification & 6,000 OJT		$54.32	$73.16	$91.99	

Subdivision of county Onondaga, Leslie, Stockbridge & Bunker Hill townships

General Request #: 544
Requestor:
Project Description:
Project Number:
County: Ingham

GENERAL INFORMATION

Date Rendered: 2/22/2024

GENERAL INFORMATION

Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Installer - Repairman						
		IBEW 876 & IBEW 17 - Teledata	$38.78	$52.83	$66.87	H H H X X X X D Y
	Apprentice Rates:					
	Lineman (6th - 6 months)		$35.61	$49.90	$64.18	
	Lineman (5th - 6 months)		$33.06	$46.07	$59.08	
	Lineman (4th - 6 months)		$30.53	$42.27	$54.02	
	Lineman (3rd - 6 months)		$27.99	$38.47	$48.94	
	Lineman (2nd - 6 months)		$25.45	$34.66	$43.86	
	Lineman (1st - 6 months)		$22.91	$30.85	$38.78	
Ironworker						
Reinforced Iron Work		IR-25-RF	$69.51	$85.85	$102.19	H H D H H D D D N
	Apprentice Rates:					
	Level 8		$66.76	$82.48	$98.19	
	Level 7		$66.76	$82.48	$98.19	
	Level 1		$52.63	$64.23	$75.83	
	Level 2		$54.68	$66.77	$78.86	
	Level 3		$56.56	$68.98	$81.40	
	Level 4		$59.41	$72.65	$85.88	
	Level 5		$62.27	$76.32	$90.37	
	Level 6		$66.76	$82.48	$98.19	
Rigging Work		IR-25-RIG	$76.08	$92.93	$109.78	H H D H H H D D N
	Apprentice Rates:					
	Level 8		$69.43	$84.94	$100.45	
	Level 1		$51.75	$62.38	$73.01	
	Level 2		$52.56	$63.54	$74.52	
	Level 3		$54.83	$66.33	$77.83	
	Level 4		$57.51	$69.71	$81.91	
	Level 5		$60.60	$73.67	$86.74	
	Level 6		$63.27	$77.04	$90.80	
	Level 7		$66.35	$80.99	$95.62	

GENERAL INFORMATION

Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Structural, ornamental, welder and pre-cast	If bad weather, Friday may be a make up day. If holiday celebrated on a Monday, 4 10s may be worked Tuesday thru Friday.	IR-25-STR	$76.21	$102.75	$129.29	H H D H H H D D Y
	Apprentice Rates:					
	Level 8		$69.43	$84.94	$100.45	
	Level 1		$51.25	$61.88	$72.51	
	Level 2		$52.56	$63.54	$74.52	
	Level 3		$54.83	$66.33	$77.83	
	Level 4		$57.51	$70.34	$83.17	
	Level 5		$60.60	$73.67	$86.74	
	Level 6		$63.27	$77.04	$90.80	
	Level 7		$66.35	$80.98	$95.62	
Journeyman Signal Technician		IBEW 876 & IBEW 17 - Roadway	$67.89	$98.24	$128.58	H H H H H H H D Y
Journeyman Specialist		IBEW 876 & IBEW 17 - Roadway	$76.98	$111.87	$146.76	H H H H H H H D Y
Labor Crew Foreman		IBEW 876 & IBEW 17 - Roadway	$61.86	$89.19	$116.52	H H H H H H H D Y
Laborer						
Journeyperson - building and heavy construction craft laborer, portable concrete mixer operator, air, electric or gasoline tool operator, hot dope carrier, tar kettle tender, gasoline vibrators, concrete gas buggies, concrete saw, signal person and top pe		L499L	$38.53	$51.20	$63.86	X X H H H H H D Y
	Apprentice Rates:					
	0-1,000 hours		$32.20	$41.70	$51.20	
	1,001-2,000 hours		$33.46	$43.60	$53.73	
	2,001-3,000 hours		$34.73	$45.50	$56.26	
	3,001-4,000 hours		$37.26	$49.30	$61.33	
Ground Burner		L499LG	$50.83	$66.15	$81.46	X X H H H H H D Y

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
High Burner	L499LH	$51.33	$66.90	$82.46	H H H H H H H D Y
Apprentice Rates:					
Laborer Road Class 1: asphalt shoveler or loader, yard man, fence erector tender, dumper, joint filling, form setting, form stripper, pavement reinforcing, waterproofing, seal coating, bridge painting, sandblasting, pressure grouting, RC equipment	MITA-RZ2-C1	$45.39	$58.38	$71.36	H H H H H H H D Y
Apprentice Rates:					
3,001-4,000 hours					
2,001-3,000 hours					
1,001-2,000 hours					
0-1,000 hours					
3,001-4,000 hours		$44.09	$56.42	$68.76	
2,001-3,000 hours		$41.49	$52.52	$63.56	
1,001-2,000 hours		$40.20	$50.59	$60.98	
0-1,000 hours		$38.90	$48.64	$58.38	
Laborer Road Class 2: mixer operator, air or electric tool operator, spreader, boxman, concreter paddler, power chain saw operator, paving patch truck dumper, tunnel mucker, concrete saw operator, dry pack macine and roto-mill grounds person	MITA-RZ2-C2	$45.59	$58.18	$71.26	H H H H H H H D Y
Apprentice Rates:					
3,001-4,000 hours		$44.28	$56.21	$68.64	
2,001-3,000 hours		$41.66	$52.28	$63.40	
1,001-2,000 hours		$40.36	$50.33	$60.80	
0-1,000 hours		$39.05	$48.36	$58.18	
Laborer Road Class 3: tunnel miner, finish tenders, guard rail builder, median barrier installer, earth retention barrier and wall installer, fence erector, bottom man, powder man, wagon drill and air track operator, curb and side rail setter	MITA-RZ2-C3	$45.43	$58.64	$71.84	H H H H H H H D Y
Apprentice Rates:					
3,001-4,000 hours		$44.11	$56.66	$69.20	
2,001-3,000 hours		$41.47	$52.70	$63.92	
1,001-2,000 hours		$40.15	$50.72	$61.28	
0-1,000 hours		$38.83	$48.74	$58.64	

GENERAL INFORMATION

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Laborer Road Class 4: asphalt raker	MITA-RZ2-C4	$46.18	$59.56	$72.94	H H H H H H H D Y
Apprentice Rates:					
3,001-4,000 hours		$44.84	$57.55	$70.26	
2,001-3,000 hours		$42.17	$53.54	$64.92	
1,001-2,000 hours		$40.83	$51.54	$62.24	
0-1,000 hours		$39.49	$49.52	$59.56	
Laborer Road Class 5: pipe layers, oxy-gun	MITA-RZ2-C5	$46.05	$59.37	$72.68	H H H H H H H D Y
Apprentice Rates:					
3,001-4,000 hours		$44.72	$57.37	$70.02	
2,001-3,000 hours		$42.06	$53.38	$64.70	
1,001-2,000 hours		$40.72	$51.37	$62.02	
0-1,000 hours		$39.39	$49.38	$59.36	
Laborer Road Class 6: line form setter for curb or pavement, asphalt screed checker/screw man on asphalt paving machines	MITA-RZ2-C6	$46.39	$59.88	$73.36	H H H H H H H D Y
Apprentice Rates:					
3,001-4,000 hours		$45.04	$57.85	$70.66	
2,001-3,000 hours		$42.34	$53.80	$65.26	
1,001-2,000 hours		$41.00	$51.79	$62.58	
0-1,000 hours		$39.65	$49.76	$59.88	
Laborer Road Class 7: concrete specialist - including finishing and trowling, cast in place or precast by any method	MITA-RZ2-C7	$48.96	$63.73	$78.50	H H H H H H H D Y
Apprentice Rates:					
3,001-4,000 hours		$47.48	$61.51	$75.54	
2,001-3,000 hours		$44.53	$57.08	$69.64	
1,001-2,000 hours		$43.05	$54.86	$66.68	
0-1,000 hours		$41.58	$52.66	$63.74	
Asbestos & Lead Abatement Laborer 4 ten hour days @ straight time allowed Monday-Saturday, must be consecutive calendar days	MLDC	$50.60	$65.37	$80.13	H H H X X X X D Y
Apprentice Rates:					
Trainee 600 hours +1 year		$34.07			

GENERAL INFORMATION

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Laborer - Hazardous					
Class A Laborer - performing work in conjunction with site preparation and other preliminary work prior to actual removal, handling, or containment of hazardous waste substances not requiring use of personal protective equipment required by state or feder	LHAZ-Z6-A	$38.53	$51.20	$63.86	H H H H H H H D Y
Apprentice Rates:					
0-1,000 work hours		$32.20	$41.70	$51.20	
1,001-2,000 work hours		$33.46	$47.09	$60.72	
2,001-3,000 work hours		$34.73	$45.50	$56.26	
3,001-4,000 work hours		$37.26	$49.29	$61.32	
Class B Laborer - performing work in conjunction with the removal, handling, or containment of hazardous waste substances when the use of personal protective equipment levels "A", "B" or "C" is required.	LHAZ-Z6-B	$39.53	$52.70	$65.86	H H H H H H H D Y
Apprentice Rates:					
0-1,000 work hours		$32.95	$42.82	$52.70	
1,001-2,000 work hours		$34.26	$44.79	$55.32	
2,001-3,000 work hours		$35.58	$46.77	$57.96	
3,001-4,000 work hours		$38.21	$50.72	$63.22	
Laborer - Landscape					
Class B1: Landscape Operator includes air, gas, and diesel equipment operator, lawn sprinkler installer,skidsteer, mini excavators, backhoe loaders, ride and walk behind trenchers, off road dump vehicle, articulated haulers, hydroseeder, wheel loaders	LLAN-Z1-A	$32.40	$42.43	$52.95	X X H X X X H D Y
Class B2: Skilled Landscape Laborer: small power tool operator, lawn sprinkler installers' tender, irrigation installers' tender, material mover	LLAN-Z1-B	$30.40	$39.93	$49.45	X X H X X X H D Y
Class B1: Landscape Operatior includes air, gas, and diesel equipment operator, lawn sprinkler installer,skidsteer, mini excavators, ride and walk behind trenchers, backhoe loaders, off road dump vehicle, articulated haulers, hydroseeder, wheel loaders	LLAN-Z2-A	$32.40	$42.96	$53.48	X X H X X X H D Y
Class B2: Skilled Landscape Laborer: small power tool operator, lawn sprinkler installers' tender, irrigation installers' tender material mover	LLAN-Z2-B	$30.40	$39.93	$49.45	X X H X X X H D Y
Class C: landscape laborer with 90 or more calendar days worked	LLAN-Z2-C	$24.66	$33.27	$41.87	H H H H H H H D N
Class D: Inexperienced landscape laborer - individual who has worked less than 90 calendar days	LLAN-Z2-D	$15.54	$23.31	$31.08	H H H H H H H D N

GENERAL INFORMATION

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Laborer Underground - Tunnel, Shaft & Caisson					
Class I - Tunnel, shaft and caisson laborer, dump man, shanty man, hog house tender, testing man (on gas), and watchman.	LAUCT-Z2-1	$38.97	$50.26	$61.54	X X X X X X X D Y
Apprentice Rates:					
0-1,000 work hours		$32.85	$42.64	$52.43	
1,001-2,000 work hours		$33.97	$44.32	$54.67	
2,001-3,000 work hours		$35.08	$45.99	$56.89	
3,001-4,000 work hours		$37.31	$49.33	$61.35	
Class II - Manhole, headwall, catch basin builder, bricklayer tender, mortar man, material mixer, fence erector, and guard rail builder	LAUCT-Z2-2	$39.06	$50.39	$61.72	X X X X X X X D Y
Apprentice Rates:					
0-1,000 work hours		$32.92	$42.75	$52.57	
1,001-2,000 work hours		$34.04	$44.43	$54.81	
2,001-3,000 work hours		$35.16	$46.11	$57.05	
3,001-4,000 work hours		$37.39	$49.45	$61.51	
Class III - Air tool operator (jack hammer man, bush hammer man and grinding man), first bottom man, second bottom man, cage tender, car pusher, carrier man, concrete man, concrete form man, concrete repair man, cement invert laborer, cement finisher, con	LAUCT-Z2-3	$39.16	$50.54	$61.92	X X X X X X X D Y
Apprentice Rates:					
0-1,000 work hours		$32.99	$42.85	$52.71	
1,001-2,000 work hours		$34.12	$44.55	$54.97	
2,001-3,000 work hours		$35.24	$46.23	$57.21	
3,001-4,000 work hours		$37.49	$49.60	$61.71	
Class IV - Tunnel, shaft and caisson mucker, bracer man, liner plate man, long haul dinky driver and well point man.	LAUCT-Z2-4	$39.58	$51.17	$62.76	X X X X X X X D Y
Apprentice Rates:					
0-1,000 work hours		$33.11	$43.03	$52.95	
1,001-2,000 work hours		$34.25	$44.74	$55.23	
2,001-3,000 work hours		$35.38	$46.43	$57.49	
3,001-4,000 work hours		$37.64	$49.83	$62.01	

GENERAL INFORMATION

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Class V - Tunnel, shaft and caisson miner, drill runner, keyboard operator, power knife operator, reinforced steel or mesh man (e.g. wire mesh, steel mats, dowel bars)	LAUCT-Z2-5	$39.58	$51.17	$62.76	X X X X X X X D Y
Apprentice Rates:					
0-1,000 work hours		$33.31	$43.33	$53.35	
1,001-2,000 work hours		$34.45	$45.04	$55.63	
2,001-3,000 work hours		$35.60	$46.77	$57.93	
3,001-4,000 work hours		$37.89	$50.20	$62.51	
Class VI - Dynamite man and powder man.	LAUCT-Z2-6	$39.34	$52.38	$65.41	X X X X X X X D Y
Apprentice Rates:					
0-1,000 work hours		$33.54	$43.67	$53.81	
1,001-2,000 work hours		$34.70	$45.41	$56.13	
2,001-3,000 work hours		$35.86	$47.15	$58.45	
3,001-4,000 work hours		$38.18	$50.63	$63.09	
Class VII - Restoration laborer, seeding, sodding, planting, cutting, mulching and topsoil grading and the restoration of property such as replacing mail boxes, wood chips, planter boxes and flagstones.	LAUCT-Z2-7	$32.16	$40.04	$47.92	X X X X X X X D Y
Apprentice Rates:					
0-1,000 work hours		$27.75	$34.99	$42.23	
1,001-2,000 work hours		$28.52	$36.15	$43.77	
2,001-3,000 work hours		$29.29	$37.30	$45.31	
3,001-4,000 work hours		$30.84	$39.63	$48.41	
Laborer -Underground Open Cut, Class I					
Construction Laborer	LAUC-Z3-1	$36.91	$47.01	$57.10	X X X X X X X D Y
Apprentice Rates:					
0-1,000 work hours		$31.39	$40.40	$49.41	
1,001-2,000 work hours		$32.38	$41.88	$51.39	
2,001-3,000 work hours		$33.38	$43.38	$53.39	
3,001-4,000 work hours		$35.37	$46.37	$57.37	

GENERAL INFORMATION

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Laborer -Underground Open Cut, Class II					
Mortar and material mixer, concrete form man, signal man, well point man, manhole, headwall and catch basin builder, guard rail builders, headwall, seawall, breakwall, dock builder and fence erector.	LAUC-Z3-2	$37.05	$47.22	$57.38	X X X X X X X D Y
Apprentice Rates:					
0-1,000 work hours		$31.49	$40.55	$49.61	
1,001-2,000 work hours		$32.49	$42.05	$51.61	
2,001-3,000 work hours		$33.50	$43.56	$53.63	
3,001-4,000 work hours		$35.50	$46.56	$57.63	
Laborer -Underground Open Cut, Class III					
Air, gasoline and electric tool operator, vibrator operator, drillers, pump man, tar kettle operator, bracers, rodder, reinforced steel or mesh man (e.g. wire mesh, steel mats, dowel bars, etc.), cement finisher, welder, pipe jacking and boring man, wagon	LAUC-Z3-3	$37.17	$47.40	$57.62	X X X X X X X D Y
Apprentice Rates:					
0-1,000 work hours		$31.58	$40.68	$49.79	
1,001-2,000 work hous		$32.59	$42.20	$51.81	
2,001-3,000 work hours		$33.60	$43.72	$53.83	
3,001-4,000 work hours		$35.61	$46.73	$57.85	
Laborer -Underground Open Cut, Class IV					
Trench or excavating grade man.	LAUC-Z3-4	$37.22	$47.47	$57.72	X X X X X X X D Y
Apprentice Rates:					
0-1,000 work hours		$31.62	$40.74	$49.87	
1,001-2,000 work hours		$32.63	$42.26	$51.89	
2,001-3,000 work hours		$33.64	$43.78	$53.91	
3,001-4,000 work hours		$35.66	$46.80	$57.95	
Laborer -Underground Open Cut, Class V					
Pipe Layer (including crock, metal pipe, multiplate or other conduits)	LAUC-Z3-5	$37.36	$47.68	$58.00	X X X X X X X D Y
Apprentice Rates:					
0-1,000 work hours		$31.73	$40.91	$50.09	
1,001-2,000 work hours		$32.74	$42.42	$52.11	
2,001-3,000 work hours		$33.76	$43.96	$54.15	
3,001-4,000 work hours		$35.79	$47.00	$58.21	

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Laborer -Underground Open Cut, Class VI					
Grouting man, top man assistant, audio visual television operations and all other operations in connection with closed circuit television inspection, pipe cleaning and pipe relining work and the installation & repair of water service pipe & appurtenances	LAUC-Z3-6	$34.66	$43.63	$52.60	X X X X X X X D Y
Apprentice Rates:					
0-1,000 work hours		$29.70	$37.86	$46.03	
1,001-2,000 work hours		$30.58	$39.18	$47.79	
2,001-3,000 work hours		$31.46	$40.50	$49.55	
3,001-4,000 work hours		$33.23	$43.16	$53.09	
Laborer -Underground Open Cut, Class VII					
Restoration laborer, seeding, sodding, planting, cutting, mulching and topsoil grading and the restoration of property such as replacing mail boxes, wood chips, planter boxes, flagstones etc.	LAUC-Z3-7	$31.81	$39.36	$46.90	X X X X X X X D Y
Apprentice Rates:					
0-1,000 work hours		$27.56	$34.66	$41.75	
1,001-2,000 work hours		$28.30	$35.76	$43.23	
2,001-3,000 work hours		$29.04	$36.88	$44.71	
3,001-4,000 work hours		$30.52	$39.10	$47.67	
Landscape Laborer					
Class A: Irrigation Foremen and Construction Foremen.	LLAN-Z1-A	$34.62	$46.26	$57.89	x X H X X x H D Y H
Lanscape Laborer					
Class A: Irrigation Foremen and Construction Foremen.	LLAN-Z1	$34.62	$46.26	$57.89	X X H X X X X D Y
Subdivision of county Zones 1 & 2					
Lineman, Teledata Wireman					
	IBEW 876 & IBEW 17 - Teledata	$38.78	$52.83	$66.87	H H H X X X X D Y
Apprentice Rates:					
Lineman (6th - 6 months)		$35.61	$49.90	$64.18	
Lineman (5th - 6 months)		$33.06	$46.07	$59.08	
Lineman (4th - 6 months)		$30.53	$42.27	$54.02	
Lineman (3rd - 6 months)		$27.99	$38.47	$48.94	
Lineman (2nd - 6 months)		$25.45	$34.66	$43.86	
Lineman (1st - 6 months)		$22.91	$30.85	$38.78	

GENERAL INFORMATION

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Operating Engineer					
Forklift, lull, extend-a-boom forkliftWork in excess of 12 per day M-F shall be paid at double time.	EN-324-FL	$63.36	$79.81	$96.25	X X X X D D D D Y
Class I - diver/wet tender, engineer, blaster, leverman	EN-324-Statewide	$82.82	$107.82	$132.82	x x X X X X X D N H
Class III - Deck equip. operator, maintenance of crane or excavator, tug/launch operator, loader/dozer on barge/deck machinery, truck-able tug, lead surveyor, ROV operator, AB deckhand, welder	EN-324-Statewide-III	$76.82	$98.82	$120.82	X X X X X X X D N
Class IV - Deck equipment operator, machineryman/fireman, off road trucks, deck hand, tug engineer, assistant tug operator, blaster helper, deck hand, jet machine, subsea plow, trencher, tug engineer	EN-324-Statewide-IV	$72.32	$92.07	$111.82	H X X X X X X D N x
Ind. Forklift/forktruck under 5,000 lb capacity power jacks/poer packs, composite crew only	EN-324-SW	$64.70	$81.75	$98.80	H H D H H H D D Y
Compressor or Welding MachineFour 10 hour days may be scheduled Monday-Thursday or Tuesday-Friday. Work not performed due to weather, Monday-Thursday may be scheduled on Friday.	EN-AC	$56.05	$69.32	$82.58	X X X X D D D D Y
Forklift or Straight Mast Four 10 hour days may be scheduled M-Th or T-F. Work not performed due to weather on M-Th may be scheduled on Friday	EN-F	$57.50	$71.40	$85.29	X X X X D D D D Y
Fireman or Oiler Four 10 hour days may be scheduled Monday-Thursday or Tuesday-Friday. Work not performed due to weather, Monday-Thursday may be scheduled on Friday.	EN-FO	$55.02	$67.84	$80.65	X X X X D D D D Y
Lull or Extend-a-Boom ForkliftFour 10 hour days may be scheduled M-Th or T-F. Work not performed due to weather on M-Th may be scheduled on Friday	en-l	$59.73	$77.09	$94.45	X X H H D D D D Y
Crane with main boom & jib 120' or longerFour 10 hour days may be scheduled Monday-Thursday or Tuesday-Friday. Worked not performed due to weather, Monday-Thursday may be scheuled Friday	en-os120	$63.27	$82.40	$101.53	X X H H D D D D Y
Crane w/ main Boom & Jib 220' or longerFour 10 hour days may be scheduled Monday-Thursday or Tuesday-Friday. Work not performed due to weather, Monday-Thursday may be scheduled on Friday.	EN-OSA	$64.38	$84.07	$103.75	X X H H D D D D Y

GENERAL INFORMATION

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Crane w/ main Boom & Jib 300' or longerFour 10 hour days may be scheduled Monday-Thursday or Tuesday-Friday. Work unabled to be performed due to weather, Monday-Thursday may be scheduled on Friday.	EN-OSA3	$65.89	$86.33	$106.77	X X H H D D D D Y
Crane w/ main Boom & Jib 400' or longerFour 10 hour days may be scheduled Monday-Thursday or Tuesday-Friday. Work not performed due to weather, Monday-Thursday may be scheduled on Friday.	EN-OSA4	$78.46	$101.49	$124.52	X X X X X X X D Y
Crane with main boom and jib 140' or longerFour 10 hour days may be scheduled Monday-Thursday or Tuesday-Friday. Work unabled to be performed due to weather, Monday-Thursday may be scheduled on Friday.	EN-OSB	$64.09	$83.63	$103.17	X X H H D D D D Y
Regular Crane Operator, Job Mechanic, Concrete Pump with BoomFour 10 hour days may be scheduled Monday-Thursday or Tuesday-Friday. Work not performed due to weather, Monday-Thursday may be scheduled on Friday.	EN-RC	$66.04	$83.65	$101.26	X X X X D D D D Y
Apprentice Rates:					
0-999 hours		$51.13	$64.18	$77.22	
1,000-1,999 hours		$52.99	$66.96	$80.94	
2,000-2,999 hours		$54.86	$69.77	$84.68	
3,000-3,999 hours		$56.72	$72.56	$88.40	
4,000-4,999 hours		$58.59	$75.36	$92.14	
5,000-5,999 hours		$60.44	$78.15	$95.84	
Regular Engineer, Hydro Excavator & Remote Controlled Concrete BreakerFour 10 hour days may be scheduled Monday-Thursday or Tuesday-Friday. Work not performed due to weather, Monday-Thursday may be scheduled on Friday.	en-re	$65.07	$82.26	$99.44	X X X X D D D D Y
Apprentice Rates:					
5,000-5,999 hours		$63.09	$81.87	$100.64	
4,000-4,999 hours		$61.11	$78.90	$96.68	
3,000-3,999 hours		$59.13	$75.93	$92.72	
2,000-2,999 hours		$57.16	$72.97	$88.78	
1,000-1,999 hours		$55.19	$70.02	$84.84	
1-999 hours		$53.21	$67.02	$80.85	

Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Journeyman - Class IV		OE-324-Statewide	$56.46	$70.09	$83.72	X X X X X X X D Y
	Apprentice Rates:					
	31-36 months		$62.01	$80.44	$98.88	
	25-30 months		$60.08	$77.54	$95.01	
	19-24 months		$58.13	$74.62	$91.13	
	13-18 months		$56.19	$71.72	$87.24	
	7-12 months		$54.25	$68.81	$83.36	
	0-6 months		$48.21	$59.76	$71.29	
	Apprentice Rates:					
	31-36 months		$62.01	$80.44	$98.88	
	25-30 months		$60.08	$77.54	$95.01	
	19-24 months		$58.13	$74.62	$91.13	
	13-18 months		$56.19	$71.72	$87.24	
	7-12 months		$54.25	$68.81	$83.36	
	0-6 months		$48.21	$59.76	$71.29	
	Apprentice Rates:					
	31-36 months		$62.01	$80.44	$98.88	
	25-30 months		$60.08	$77.54	$95.01	
	19-24 months		$58.13	$74.62	$91.13	
	13-18 months		$56.19	$71.72	$87.24	
	7-12 months		$54.25	$68.81	$83.36	
	0-6 months		$48.21	$59.76	$71.29	
	Apprentice Rates:					
	31-36 months		$62.01	$80.44	$98.88	
	25-30 months		$60.08	$77.54	$95.01	
	19-24 months		$58.13	$74.62	$91.13	
	13-18 months		$56.19	$71.72	$87.24	
	7-12 months		$54.25	$68.81	$83.36	
	0-6 months		$48.21	$59.76	$71.29	

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Apprentice Rates:					
31-36 months		$62.01	$80.44	$98.88	
25-30 months		$60.08	$77.54	$95.01	
19-24 months		$58.13	$74.62	$91.13	
13-18 months		$56.19	$71.72	$87.24	
7-12 months		$54.25	$68.81	$83.36	
0-6 months		$48.21	$59.76	$71.29	
Operating Engineer - Marine Construction					
Diver/Wet Tender/Tender/Rov Pilot/Rov Tender	GLF D	$52.81	$78.57	$104.32	H H H H H H H D N
Diver/Wet Tender, Engineer (hydraulic dredge)	GLF-1	$78.97	$102.47	$125.97	X X H H H H H D Y
Subdivision of county all Great Lakes, islands therein, & connecting & tributary waters					
Crane/Backhoe Operator, 70 ton or over Tug Operator, Mechanic/Welder, Assistant Engineer (hydraulic dredge), Leverman (hydraulic dredge), Diver Tender	GLF-2	$77.47	$100.22	$122.97	X X H H H H H D Y
Subdivision of county All Great Lakes, islands therein, & connecting & tributary waters					
Friction, Lattice Boom or Crane License Certification30	GLF-2B	$78.97	$102.47	$125.97	X X H H H H H D Y
Subdivision of county All Great Lakes, islands, therein, & connecting & tributary waters					
Deck Equipment Operator, Machineryman, Maintenance of Crane (over 50 ton capacity) or Backhoe (115,000 lbs or more), Tug/Launch Operator, Loader, Dozer on Barge, Deck Machinery	GLF-3	$72.92	$93.40	$113.87	X X H H H H H D Y
Subdivision of county All Great Lakes, islands therein, & connecting & tributary waters					
Deck Equipment Operator, (Machineryman/Fireman), (4 equipment units or more), Off Road Trucks, Deck Hand, Tug Engineer, & Crane Maintenance 50 ton capacity and under or Backhoe 115,000 lbs or less, Assistant Tug Operator	GLF-4	$66.72	$84.10	$101.47	X X H H H H H D Y
Subdivision of county All Great Lakes, islands therein, & connecting & tributary waters					
Operating Engineer Steel Work					
Extended boom forklift over 5,000 lb capacity, 1 Drum Hoist	EN-324-ef	$69.61	$88.88	$108.15	H H D H H H D D Y
Crane w/ 120' boom or longer	EN-324-SW120	$74.14	$95.24	$116.33	H H D H H H D D Y
Crane w/ 120' boom or longer w/ Oiler	EN-324-SW120-O	$75.01	$96.54	$118.07	H H D H H H D D Y
Crane w/ 140' boom or longer	EN-324-SW140	$75.19	$96.80	$118.41	H H D H H H D D Y

GENERAL INFORMATION

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Crane w/ 140' boom or longer W/ Oiler	EN-324-SW140-O	$76.19	$98.24	$120.28	H H D H H H D D Y
Boom & Jib 220' or longer	EN-324-SW220	$76.46	$98.62	$120.78	H H D H H H D D Y
Crane w/ 220' boom or longer w/ Oiler	EN-324-SW220-O	$74.01	$95.11	$116.20	H H D H H H D D Y
Boom & Jib 300' or longer	EN-324-SW300	$76.96	$99.34	$121.72	H H D H H H D D Y
Crane w/ 300' boom or longer w/ Oiler	EN-324-SW300-O	$77.96	$100.78	$123.59	H H D H H H D D Y
Boom & Jib 400' or longer	EN-324-SW400	$78.46	$101.49	$124.52	H H D H H H D D Y
Crane w/ 400' boom or longer w/ Oiler	EN-324-SW400-O	$79.46	$102.93	$126.39	H H D H H H D D Y
Crane Operator, Job Mechanic, 3 Drum Hoist & Excavator	EN-324-SWCO	$73.65	$94.59	$115.53	H H D H H H D D Y
Apprentice Rates:					
0-999 hours		$59.16	$76.02	$92.88	
1,000-1,999 hours		$61.56	$79.63	$97.68	
2,000-2,999 hours		$63.96	$83.22	$102.48	
3,000-3,999 hours		$66.38	$84.18	$101.98	
4,000-4,999 hours		$68.78	$90.46	$112.12	
5,000 hours		$71.20	$91.09	$110.99	
Crane Operator w/ Oiler	EN-324-SWCO-O	$74.65	$96.03	$117.40	H H D H H H D D Y
Compressor or Welder Operator	EN-324-SWCW	$37.03	$49.48	$61.92	H H D H H H D D Y
Hoisting Operator, 2 Drum Hoist, & Rubber Tire Backhoe	EN-324-SWHO	$73.01	$93.67	$114.33	H H D H H H D D Y
Oiler	EN-324-SWO	$53.42	$67.61	$81.80	H H D H H H D D Y
Tower Crane & Derrick where work is 50' or more	EN-324-SWTD50	$74.74	$96.16	$117.57	H H D H H H D D Y
Tower Crane & Derrick 50' or more w/ Oiler	EN-324-SWTD50-O	$75.84	$97.69	$119.54	H H D H H H D D Y

GENERAL INFORMATION

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Operating Engineer Underground					
Class I Equipment	EN-324A1-UC1	$66.39	$84.19	$101.98	X X X X X X X D Y
	Apprentice Rates:				
	0-999 hours	$52.76	$67.08	$81.41	
	1,000-1,999 hours	$54.80	$70.14	$85.49	
	2,000-2,999 hours	$56.85	$73.22	$89.59	
	3,000-3,999 hours	$58.90	$76.30	$93.69	
	4,000-4,999 hours	$60.94	$79.35	$97.77	
	5,000-5,999 hours	$62.99	$82.43	$101.87	
Class I Equipment - Backfiller Tamper, Backhoe, Batch Plant Operator, Clamshell, Concrete Paver 2 drums or larger, Conveyor Loader Euclid type, Crane (crawler, truck type or pile driving), Dozer, Dragline, Elevating Grader, endloader, gradall, grader, hyd	EN-324A2-UC1	$65.17	$82.61	$100.05	X X X X X X X D Y
	Apprentice Rates:				
	0-999 hours	$49.19	$61.74	$74.29	
	1,000-1,999 hours	$50.99	$64.44	$77.89	
	2,000-2,999 hours	$52.78	$67.12	$81.47	
	3,000-3,999 hours	$54.58	$69.82	$85.07	
	4,000-4,999 hours	$56.37	$72.51	$88.65	
	5,000-5,999 hours	$58.16	$75.19	$92.23	
Class II Equipment - Boom Truck, Crusher, Hoist, Pump 6 inch discharge or larger, side boom tractor, Tractor (pneu-tired other than backhoe or front end loader), Trencher 8 ft. digging capcity and smaller, Vac Truck	EN-324A2-UC2	$60.42	$75.80	$91.17	X X X X X X X D Y
Class III Equipment - Air Compressors 600 cfm or larger, Air Compressors 2 or more less than 600 dfm, Boom Truck non-swinging non-powered type boom, Concrete Breaker self-propelled or truck mounted, Concrete paver 1 drum 1/2 yd. or larger, Elevator other	EN-324A2-UC3	$59.59	$74.61	$89.62	X X X X X X X D Y
Class IV Equipment - Boiler, Concrete Saw 40 hp or over, curing machine self propelled, end dumps, extend a boom forklift, farm tractor with attachment, finishing machine concrete, firemen, hydraulic pipe pushing machine, mulching equipment, oiler, pumps	EN-324A2-UC4	$58.93	$73.66	$88.38	X X X X X X X D Y

GENERAL INFORMATION

Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Painter						
Painter	A 4-10s workweek allowed Monday-Thursday.	PT-845-BR	$40.09	$52.29	$64.49	H H H H H H H D Y
	Apprentice Rates:					
	1st level		$27.89	$33.99	$40.09	
	2nd level		$30.33	$37.65	$44.97	
	3rd level		$33.99	$43.14	$52.29	
	4th level		$37.65	$48.63	$59.61	
Pipe and Manhole Rehab						
General Laborer for rehab work or normal cleaning and cctv work-top man, scaffold man, CCTV assistant, jetter-vac assistant		TM247	$28.20	$38.20	$48.19	H H H H H H H H N
Tap cutter/CCTV Tech/Grout Equipment Operator: unit driver and operator of CCTV; grouting equipment and tap cutting equipment		TM247-2	$32.70	$44.95	$57.19	H H H H H H H H N
CCTV Technician/Combo Unit Operator: unit driver and operator of cctv unit or combo unit in connection with normal cleaning and televising work		TM247-3	$31.45	$43.07	$54.69	H H H H H H H H N
Boiler Operator: unit driver and operator of steam/water heater units and all ancillary equipment associated		TM247-4	$33.20	$45.70	$58.19	H H H H H H H H N
Combo Unit driver & Jetter-Vac Operator		TM247-5	$33.20	$45.70	$58.19	H H H H H H H H N
Pipe Bursting & Slip-lining Equipment Operator		TM247-6	$34.20	$47.20	$60.19	H H H H H H H H N
Plasterer						
Plasterer		CE514-P-L	$45.00	$59.93	$74.85	H H H H H H H D N
	Apprentice Rates:					
	1st Year		$34.55	$44.25	$53.95	
	2nd Year		$37.54	$48.73	$59.93	
	3rd Year		$40.52	$53.21	$65.89	

GENERAL INFORMATION

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Plumber & Pipefitter					
Plumber, Pipefitter and HVACTech Four 10s allowed Monday thru Thursday. Friday not a makeup, considered OT, paid @ time & one-half.	PL-333-RI	$63.77	$95.66	$127.54	H H H H H H H D Y
Apprentice Rates:					
1st 6 months		$41.61	$62.42	$83.22	
2nd 6 months		$43.62	$65.43	$87.24	
3rd 6 months		$45.64	$68.46	$91.28	
4th 6 months		$47.65	$71.48	$95.30	
5th 6 months		$49.67	$74.50	$99.34	
6th 6 months		$51.68	$77.52	$103.36	
7th 6 months		$53.70	$80.55	$107.40	
8th 6 months		$55.71	$83.56	$111.42	
9th 6 months		$57.73	$86.60	$115.46	
10th 6 months		$59.74	$89.61	$119.48	
Roofer					
Commercial Roofer 4 consecutive tens allowed M-TH5 consecutive nine hour days M-F also allowed, time over forty hours per/week shall be at OT. Sat makeup day	RO-70-Z2	$48.36	$63.20	$78.04	H X X X X X X D Y x
Apprentice Rates:					
1st Class		$32.77	$40.27	$47.77	
2nd Class		$34.88	$43.38	$51.88	
3rd Class		$36.77	$46.19	$55.60	
4th Class		$38.90	$49.36	$59.81	
5th Class		$41.05	$52.53	$64.00	
6th Class		$43.15	$55.62	$68.09	
Sewer Relining					
Class I-Operator of audio visual CCTV system including remote in-ground cutter and other equipment used in conjunction with CCTV system.	SR-I	$52.84	$69.23	$85.62	H H H H H H H D N
Apprentice Rates:					
0-6 months		$41.58	$54.66	$67.74	
6-12 months		$45.31	$60.26	$75.20	

GENERAL INFORMATION

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Class II-Operator of hot water heaters and circulation system; water jetters; and vacuum and mechanical debris removal systems and those assisting.	SR-II	$50.80	$68.49	$86.18	H H H H H H H D N
Sheet Metal Worker					
Sheet Metal Worker 4 10s allowed as consecutive days, M-Th or T-F	SHM-7-1	$56.87	$75.25	$93.62	H H H H D D D D Y
Apprentice Rates:					
First Year		$30.01	$39.20	$48.39	
Second Year		$36.34	$47.37	$58.39	
Third Year		$45.84	$58.70	$71.56	
Fourth Year		$49.52	$64.22	$78.92	
Sprinkler Fitter					
Sprinkler Fitter	SP 669	$60.34	$78.45	$96.56	H H H H H H H D Y
Apprentice Rates:					
Class 1		$24.57	$32.72	$40.87	
Class 2		$26.38	$35.43	$44.49	
Class 3		$39.14	$49.10	$59.06	
Class 4		$40.95	$51.82	$62.68	
Class 5		$43.01	$54.78	$66.55	
Class 6		$44.82	$57.49	$70.17	
Class 7		$46.63	$60.21	$73.79	
Class 8		$48.45	$62.94	$77.43	
Class 9		$50.26	$65.65	$81.05	
Class 10		$52.07	$68.37	$84.67	

GENERAL INFORMATION

Classification Name	Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Tile, Terrazzo and Mosaic Finisher						
Tile, Terrazzo and Mosaic Finisher		BR2-TF	$42.34	$54.17	$65.99	H H H H H H H D N
	Apprentice Rates:					
	1st Period		$35.25	$43.53	$51.81	
	2nd Period		$36.43	$45.30	$54.17	
	3rd Period		$37.61	$47.07	$56.53	
	4th Period		$38.79	$48.84	$58.89	
	5th Period		$39.97	$50.61	$61.25	
	6th Period		$41.16	$52.39	$63.63	
Tile, Terrazzo and Mosaic Setters						
Tile, Terrazzo and Mosaic Setters		BR2-Tile	$48.48	$62.11	$75.73	H H H H H H H D N
	Apprentice Rates:					
	1st Period		$40.31	$49.85	$59.39	
	2nd Period		$41.67	$51.89	$62.11	
	3rd Period		$43.03	$53.93	$64.83	
	4th Period		$44.39	$55.97	$67.55	
	5th Period		$45.75	$58.01	$70.27	
	6th Period		$47.12	$60.07	$73.01	
Tower Technician						
		IBEW 876 & IBEW 17 - Roadway	$67.89	$98.24	$128.58	H H H H H H H D Y
Truck Driver						
of all trucks of 8 cubic yd capacity or over		TM-RB2	$44.10	$48.81	$49.80	H H H H H H H H Y
of all trucks of 8 cubic yard capacity or less (except dump trucks of 8 cubic yard capacity or over, tandem axle trucks, transit mix and semis, euclid type equipment, double bottoms and low boys)		TM-RB2A	$44.00	$48.66	$49.60	H H H H H H H H Y
on euclid type equipment		TM-RB2B	$44.25	$49.04		H H H H H H H H Y

General Request #: 544
Requestor:
Project Description:
Project Number:
County: Ingham

Date Rendered: 2/22/2024

GENERAL INFORMATION

Classification Name / Description		Straight Hourly	Time and a Half	Double Time	Overtime Provision
Truck Driver / Groundman (less than a yr)	IBEW 876 & IBEW 17 - Teledata	$30.78	$41.29	$51.79	H H H X X X X D Y
	Apprentice Rates:				
	Lineman (6th - 6 months)	$35.61	$49.90	$64.18	
	Lineman (5th - 6 months)	$33.06	$46.07	$59.08	
	Lineman (4th - 6 months)	$30.53	$42.27	$54.02	
	Lineman (3rd - 6 months)	$27.99	$38.47	$48.94	
	Lineman (2nd - 6 months)	$25.45	$34.66	$43.86	
	Lineman (1st - 6 months)	$22.91	$30.85	$38.78	
Truck Driver / Groundman (over 1 yr)	IBEW 876 & IBEW 17 - Teledata	$37.40	$50.84	$64.27	H H H X X X X D Y
	Apprentice Rates:				
	Lineman (6th - 6 months)	$35.61	$49.90	$64.18	
	Lineman (5th - 6 months)	$33.06	$46.07	$59.08	
	Lineman (4th - 6 months)	$30.53	$42.27	$54.02	
	Lineman (3rd - 6 months)	$27.99	$38.47	$48.94	
	Lineman (2nd - 6 months)	$25.45	$34.66	$43.86	
	Lineman (1st - 6 months)	$22.91	$30.85	$38.78	
TV Terminator - Tech II	IBEW 876 & IBEW 17 - Teledata	$38.78	$52.83	$66.87	H H H X X X X D Y
	Apprentice Rates:				
	Lineman (6th - 6 months)	$35.61	$49.90	$64.18	
	Lineman (5th - 6 months)	$33.06	$46.07	$59.08	
	Lineman (4th - 6 months)	$30.53	$42.27	$54.02	
	Lineman (3rd - 6 months)	$27.99	$38.47	$48.94	
	Lineman (2nd - 6 months)	$25.45	$34.66	$43.86	
	Lineman (1st - 6 months)	$22.91	$30.85	$38.78	

STATE OF MICHIGAN

Wage and Hour Division
PO Box 30476
Lansing, MI 48909
517-284-7800

Informational Sheet: Prevailing Wages on State Funded Projects

REQUIREMENTS

Effective February 13, 2024

The purpose of establishing prevailing rates is to provide minimum rates of pay that must be paid to workers on construction projects that are financed or financially supported by the state Prevailing rates compiled from the rates contained in collectively bargained agreements which cover the locations of the state projects. While the prevailing wage rates are compiled through surveys of collectively bargained agreements, a collective bargaining agreement is not required for contractors to be on or be awarded state projects. The prevailing rate schedule provides an hourly rate which includes wage and fringe benefit totals for designated construction mechanic classifications. The overtime rates also include wage and fringe benefit totals. Please pay special attention to the overtime and premium pay requirements. The prevailing wage is satisfied when wages plus fringe benefits are equal to or greater than the required rate.

State of Michigan responsibilities:

- The department establishes the prevailing rate for each classification of construction mechanic requested by the contracting agents prior to contracts being let out for bid on a state project.

DTMB responsibilities

- If a contract is not awarded or construction does not start within 90 days of the date of the issuance of rates, a re- determination of rates must be requested by the contracting agents.
- Rates for classifications needed but not provided on the Prevailing Rate Schedule, ***must*** be obtained ***prior*** to contracts being let out for bid on a state project.

Contractor responsibilities:

- Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing rates prescribed in a contract.
- Every contractor and subcontractor shall keep an accurate record showing the name and occupation of and the actual wages and benefits paid to each construction mechanic. This record shall be available for reasonable inspection by DTMB or the department.
- Each contractor or subcontractor is liable for the payment of the prevailing rate to its employees.
- The prime contractor is responsible for advising all subcontractors of the requirement to pay the prevailing rate prior to commencement of work.
- A construction mechanic *shall only* be paid the apprentice rate if registered with the United States Department of Labor, Bureau of Apprenticeship and Training and the rate is included in the contract.

Enforcement:

A person who has information of an alleged prevailing wage violation on a prevailing wage project may file a complaint with the State of Michigan. The department will investigate and attempt to resolve the complaint informally. During the course of an investigation, if the requested records and posting certification are not made available in compliance with contractual requirements, the Contracting Agent may consider the Contractor to be in material breach of the contract and may terminate the contract for cause at the sole discretion. There are also civil penalties for failure to be in compliance with Act 10. View the entire text of Act 10 of 2023 at michigan.gov/wagehour.

STATE OF MICHIGAN

Informational Sheet: Prevailing Wages on State Projects

General Information Regarding Fringe Benefits

Certain fringe benefits **may** be credited toward the payment of the Prevailing Wage Rate:

- If a fringe benefit is paid directly to a construction mechanic
- If a fringe benefit contribution or payment is made on behalf of a construction mechanic
- If a fringe benefit, which may be provided to a construction mechanic**,** is pursuant to a written contract or policy
- If a fringe benefit is paid into a fund, for a construction mechanic

When a fringe benefit is not paid by an hourly rate, the hourly credit will be calculated based on the annual value of the fringe benefit divided by 2080 hours per year (52 weeks @ 40 hours per week). The following is an example of the types of fringe benefits allowed and how an hourly credit is calculated:

Vacation	40 hours X $14.00 per hour = $560/2080 =	$.27
Dental insurance	$31.07 monthly premium X 12 mos. = $372.84 /2080 =	$.18
Vision insurance	$5.38 monthly premium X 12 mos. = $64.56/2080 =	$.03
Health insurance	$230.00 monthly premium X 12 mos. = $2,760.00/2080 =	$1.33
Life insurance	$27.04 monthly premium X 12 mos. = $324.48/2080 =	$.16
Tuition	$500.00 annual cost/2080 =	$.24
Bonus	4 quarterly bonus/year x $250 = $1000.00/2080 =	$.48
401k Employer Contribution	$2000.00 total annual contribution/2080 =	$.96
	Total Hourly Credit	$3.65

Other examples of the types of fringe benefits allowed:

- Sick pay
- Holiday pay
- Accidental Death & Dismemberment insurance premiums

The following are examples of items that **will not** be credited toward the payment of the Prevailing Wage Rate

- Legally required payments, such as:
  - Unemployment Insurance payments
  - Workers' Compensation Insurance payments
  - FICA (Social Security contributions, Medicare contributions)
- Reimbursable expenses, such as:
  - Clothing allowance or reimbursement
  - Uniform allowance or reimbursement
  - Gas allowance or reimbursement
  - Travel time or payment
  - Meals or lodging allowance or reimbursement
  - Per diem allowance or payment
- Other payments to or on behalf of a construction mechanic that are not wages or fringe benefits, such as:
  - Industry advancement funds
  - Financial or material loans

OVERTIME PROVISIONS for MICHIGAN PREVAILING WAGE RATE COMMERCIAL SCHEDULE

1. Overtime is represented as a nine character code. Each character represents a certain period of time after the first 8 hours Monday thru Friday.

	Monday thru Friday	Saturday	Sunday & Holidays	Four 10s
First 8 Hours		**4**	**8**	**9**
9th Hour	**1**	**5**		
10th Hour	**2**	**6**		
Over 10 hours	**3**	**7**		

Overtime for Monday thru Friday after 8 hours:
the 1st character is for time worked in the 9th hour *(8.1 - 9 hours)*
the 2nd character is for time worked in the 10th hour *(9.1 - 10 hours)*
the 3rd character is for time worked beyond the 10th hour *(10.1 and beyond)*

Overtime on Saturday:
the 4th character is for time worked in the first 8 hours on Saturday *(0 - 8 hours)*
the 5th character is for time worked in the 9th hour on Saturday *(8.1 - 9 hours)*
the 6th character is for time worked in the 10th hour *(9.1 - 10 hours)*
the 7th character is for time worked beyond the 10th hour *(10.01 and beyond)*

Overtime on Sundays & Holidays
The 8th character is for time worked on Sunday or on a holiday

Four Ten Hour Days
The 9th character indicates if an optional 4-day 10-hour per day workweek can be worked ***between Monday and Friday*** **without paying overtime after 8 hours worked, unless otherwise noted in the rate schedule. To *utilize a 4 ten workweek, notice is required from the employer to employee prior to the start of work on the project.***

2. Overtime Indicators Used in the Overtime Provision:
   H - means TIME AND ONE-HALF due
   X - means TIME AND ONE-HALF due after 40 HOURS worked
   D - means DOUBLE PAY due
   Y - means YES an optional 4-day 10-hour per day workweek can be worked without paying overtime after 8 hours worked
   N - means NO an optional 4-day 10-hour per day workweek *cannot* be worked without paying overtime after 8 hours worked

3. EXAMPLES:
   HHHHHHHDN - This example shows that the 1½ rate must be used for time worked after 8 hours Monday thru Friday *(characters 1 - 3);* for all hours worked on Saturday, 1½ rate is due *(characters 4 - 7).* Work done on Sundays or holidays must be paid double time *(character 8).* The N *(character 9)* indicates that 4 ten-hour days is not an acceptable workweek at regular pay.

   XXXHHHHDY - This example shows that the 1½ rate must be used for time worked after 40 hours are worked Monday thru Friday *(characters 1-3);* for hours worked on Saturday, 1½ rate is due *(characters 4 – 7)*. Work done on Sundays or holidays must be paid double time *(character 8).* The Y *(character 9)* indicates that 4 ten-hour days is an acceptable alternative workweek.

ENGINEERS - CLASSES OF EQUIPMENT LIST

UNDERGROUND ENGINEERS

CLASS I

Backfiller Tamper, Backhoe, Batch Plant Operator, Clam-Shell, Concrete Paver (2 drums or larger), Conveyor Loader (Euclid type), Crane (crawler, truck type or pile driving), Dozer, Dragline, Elevating Grader, End Loader, Gradall (and similar type machine), Grader, Power Shovel, Roller (asphalt), Scraper (self propelled or tractor drawn), Side Broom Tractor (type D-4 or larger), Slope Paver, Trencher (over 8' digging capacity), Well Drilling Rig, Mechanic, Slip Form Paver, Hydro Excavator.

CLASS II

Boom Truck (power swing type boom), Crusher, Hoist, Pump (1 or more 6" discharge or larger gas or diesel powered by generator of 300 amps or more, inclusive of generator), Side Boom Tractor (smaller than type D-4 or equivalent), Tractor (pneu-tired, other than backhoe or front end loader), Trencher (8' digging capacity and smaller), Vac Truck.

CLASS III

Air Compressors (600 cfm or larger), Air Compressors (2 or more less than 600 cfm), Boom Truck (non-swinging, non-powered type boom), Concrete Breaker (self-propelled or truck mounted, includes compressor), Concrete Paver (1 drum, ½ yard or larger), Elevator (other than passenger), Maintenance Man, Mechanic Helper, Pump (2 or more 4" up to 6" discharge, gas or diesel powered, excluding submersible pump), Pumpcrete Machine (and similar equipment), Wagon Drill Machine, Welding Machine or Generator (2 or more 300 amp or larger, gas or diesel powered).

CLASS IV

Boiler, Concrete Saw (40HP or over), Curing Machine (self-propelled), Farm Tractor (w/attachment), Finishing Machine (concrete), Firemen, Hydraulic Pipe Pushing Machine, Mulching Equipment, Oiler (2 or more up to 4", exclude submersible), Pumps (2 or more up to 4" discharge if used 3 hrs or more a day-gas or diesel powered, excluding submersible pumps), Roller (other than asphalt), Stump Remover, Vibrating Compaction Equipment (6' wide or over), Trencher (service) Sweeper (Wayne type and similar equipment), Water Wagon, Extend-a-Boom Forklift.

HAZARDOUS WASTE ABATEMENT ENGINEERS

CLASS I

Backhoe, Batch Plant Operator, Clamshell, Concrete Breaker when attached to hoe, Concrete Cleaning Decontamination Machine Operator, Concrete Pump, Concrete Paver, Crusher, Dozer,
Elevating Grader, Endloader, Farm Tractor (90 h.p. and higher),
Gradall, Grader, Heavy Equipment Robotics Operator, Hydro Excavator, Loader, Pug Mill, Pumpcrete Machines, Pump Trucks, Roller, Scraper (self-propelled or tractor drawn), Side Boom Tractor, Slip Form Paver, Slope Paver, Trencher, Ultra High Pressure Waterjet Cutting Tool System Operator, Vactors, Vacuum Blasting Machine Operator, Vertical Lifting Hoist, Vibrating Compaction Equipment (self-propelled), and Well Drilling Rig.

CLASS II

Air Compressor, Concrete Breaker when not attached to hoe, Elevator, End Dumps, Equipment Decontamination Operator, Farm Tractor (less than 90 h.p.), Forklift, Generator, Heater, Mulcher, Pigs (Portable Reagent Storage Tanks), Power Screens, Pumps (water), Stationary Compressed Air Plant, Sweeper, Water Wagon and Welding Machine.

CARPENTER CRAFT JURISDICTION

Michigan recognizes the Carpenters for any and all work related to weatherization that has historically been the work of the Carpenter. This work shall include, but not be limited to: all work defined under the Federal Weatherization Assistance Program.

The jurisdiction of Carpenters, as to all work that has historically and traditionally been performed consisting of the milling, fashioning, joining, assembling, erecting, fastening or dismantling of all materials of wood, plastic, metal, fiber, cork, or composition and all other substitute materials, as well as the handling, cleaning, erecting, installing and dismantling of all machinery, equipment and all materials used by Carpenters.

The jurisdiction, therefore, extends over the following divisions and subdivisions of the trade: Carpenters and Joiners, Millwrights, Pile Drivers, Bridge, Dock and Wharf Carpenters, Underpinners, Timbermen, and Core-drillers, Shipwrights, Boat Builders, Ship- hand, Stair-Builders, Millmen, Wood and Resilient Floor Decorators, Floor Finishers, Carpet-layers, Shinglers, Siders, Insulators, Acoustic and Drywall Applicators, Sharers and House Movers, Loggers, Lumber and Sawmill Workers, Reed and Rattan Workers, Shingle Weavers, Casket and Coffin Makers, Railroad Carpenters and Car Builders, regardless of material used and all those engaged in the operation of woodworking or other machinery required in fashioning, milling or manufacturing of products used in the trade, and the handling, erecting and installing materials on any of the above divisions or sub-divisions, burning, welding and rigging incidental to the trade. When the term "Carpenter and Joiner" is used, it shall mean all the subdivisions of the trade. The trade autonomy of Carpenters therefore extends over the divisions and subdivisions of the trade, which are set forth as follows:

(a) The framing, erecting and prefabrication of roofs, partitions, floors and other parts of buildings of wood, metal, plastic or other substitutes; application of all metal flashing used for hips, valleys and chimneys; the erection of Stran Steel section or its equal. The building and setting of all forms and centers for brick and masonry. The fabrication and erection of all forms for concrete and decking, the dismantling of same (as per International Agreement) when they are to be re-used on the job or stored for re-use. The cutting and handling of all falsework for fireproofing and slabs. Where power is used in the setting or dismantling of forms, all signaling and handling shall be done by carpenters. The setting of templates for anchor bolts for structural members and for machinery, and the placing, leveling and bracing of these bolts. All framing in connection with the setting or metal columns. The setting of all bulkheads, footing forms and the setting of and fabrication of, screeds and stakes for concrete and mastic floors where the screed is notched or fitted, or made up of more than one member. The making of forms for concrete block, bulkheads, figures, posts, rails, balusters and ornaments, etc.

(b) The handling and erecting of rough material and drywall, the handling, assembly, setting and leveling of all fixtures, display cases, all furniture such as tables, chairs, desks, coat racks, etc., all de-mountable or moveable partitions such as Von wall, E Wall, Steel Case, Herman Miller, Haworth, American Seating, Westinghouse, Lazy Boy, rosewood, etc. All rebuilding, remodeling and setting up of all kinds of partitions, finished lumber, metal and plastic trim to be erected by Carpenters shall be handled from the truck or vehicle delivering same to the job by Carpenters.

CARPENTER CRAFT JURISDICTION

(c) The building and moving of all scaffolding runways and staging where carpenters' tools are used, the building from the ground up of all scaffolds over fourteen (14) feet in height including metal and specially designed scaffolding. The building and construction of all hoists and derricks made of wood; the making of mortar boards, boxes, trestles, all shoring, razing and moving of buildings. Lift type trucks are to be considered a tool of the trade. Metal siding and metal roofing fall within the scope of jurisdiction for the carpenters.

(d) The cutting or framing and fireproofing of the openings for pipes, conduits, ducts, etc., where they pass through floors, partitions, walls, roofs or fixtures composed in whole or in part of wood. The laying out of making and installation of all inserts and sleeves for pipes, ducts, etc., where carpenters' tools and knowledge are required. The making and installing of all wooden meter boards, crippling and backing for fixtures. The welding of studs and other fastenings to receive material being applied by carpenters.

(e) The installation of all grounds, furring or stripping, ceilings and sidewalks, application of all types of shingling and siding, etc.

(f) The installation of all interior and exterior trim or finish of wood, aluminum, kalamein, hollow or extruded metal, plastic, doors, transoms, thresholds, mullions and windows. The setting of jambs, bucks, window frames of wood or metal where braces or wedges are used. The installation of all wood, metal or other substitutes of casing, molding, chair rail, wainscoting, china closets, base of mop boards, wardrobes, metal partitions as per National Decisions or specific agreements, etc. The complete laying out, fabrication and erection of stairs. The making and erecting of all fixtures, cabinets, shelving, racks, louvers, etc. The mortising and application of all hardware in connection with our work. The sanding and refinishing of all wood, cork or composition floors to be sanded or scraped, filled, sized and buffed, either by hand or power machines. The assembling and setting of all seats in theaters, halls, churches, schools, auditorium, grandstands and other buildings. All bowling alley work.

(g) The manufacture, fabrication and installation of all screens, storm sash, storm doors and garage doors; the installation of wood, canvas, plastic or metal awnings or eye shades, door shelters, jalousies, etc. The laying of wood, wood block and wood composition in floors.

(h) The installation of all materials used in drywall construction, such as plasterboard, all types of asbestos boards, transite and other composition board. The application of all material which serves as base for acoustic tile, except plaster. All acoustical applications as per National Agreement or specific agreement.

(i) The building and dismantling of all barricades, hand rails, guard rails, partitions and temporary partitions. The erection and dismantling of all temporary housing on construction projects.

(j) The installation of rock wool, cork and other insulation material used for sound or weatherproofing. The removal of caulking and placing of staff bead and brick mold and all Oakum caulking, substitutes, etc., and all caulking in connection with carpentry work.

(k) The installation of all chalk boards/marker boards.

CARPENTER CRAFT JURISDICTION

(l) The operation of all hand operated winches used to raise wooden structures.

(m) The erection of porcelain enameled panels and siding.

(n) The unloading and distribution of all furnished, prefabricated and built-up sections such as door bucks, window frames, cupboards, cabinets, store fixtures, counters and show cases or comparably finished or prefabricated materials, to the job sites or points of installation as used in the construction, alteration and remodeling industry.

(o) The handling of doors, metal, wood or composite, partitions and other finished bulk materials used for trim from the point of delivery.

(p) All processing of these materials and handling after processing.

(q) The making up of panels and fitting them into walls, all bracing and securing, all removal of panels from the casting including all braces, whalers, hairpins, etc.

(r) The handling and setting of all metal pans and sections from the stock piles of reasonable distance as required by job needs shall be performed by carpenters. The stripping of such metal pans, panels or sections is to be performed by carpenters.

(s) The sharpening of all carpenter hand or power tools, or those used by carpenters.

(t). The layout, fabrication, assembling of and erection and dismantling of all displays made of wood, metal, plastic, composition board or any substitute material; the covering of same with any type of material, the crating and un-crating, the handling from the point of unloading and back to the point of loading of all displays and other materials or components.

(u) The same shall apply to all other necessary component parts used for display purposes such as turntables, platforms, identification towers and fixtures, regardless of how constructed, assembled or erected or dismantled.

(v) The make-up, handling, cutting and sewing of all materials used in buntings, flags, banners, decorative paper, fabrics and similar materials used in the display decorative industry for draperies and back drops. The decorative framing of trucks, trailers and autos used as floats or moving displays. The slatting of walls to hand fabrics and other decorative materials, drilling of all holes to accommodate such installations. Setting up and removal of booths constructed of steel or aluminum tubing as stanchions, railings, etc., handling and placing of furniture, appliances, etc., which are being used to complete the booth at the request of the exhibitor. Fabricating and application of leather, plastic and other like materials used for covering of booths. The handling of all materials, fabricating of same. The loading and unloading, erecting and assembling at the exhibit of show area, also in or out of storage when used in booth decorations.

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(w) A display shall be construed as any exhibit or medium of advertising, open to private or public showing, which is constructed of wood, metal, plastic or any other substitute to accomplish the objectives of advertising or displaying.

(x) Handling, fitting, draping, measuring and installation of fixtures and other hardwares for draperies, all manner of making, measuring, repairing, sizing, hanging and installation of necessary fixtures and hardware for shades and Venetian blinds.

(y) Work consisting of cutting and/or forming of all materials in preparation for installing of floors, walls and ceilings; the installation of all resilient floor and base; wall and ceiling materials to include cork, linoleum, prefabricated, laminated, rubber, asphalt, vinyl, metal, plastic, seamless floors and all other similar materials in sheet, interlocking liquid or tile form; the installation of all artificial turf, the installation, cutting and/or fitting of carpets; installation of padding, matting, linen crash and all preformed resilient floor coverings; the fitting of all devices for the attachment of carpet and other floor, wall and ceiling coverings; track sewing of carpets, drilling of holes for sockets and pins, putting in dowels and slats; and all metal trimmings used; the installation of all underlayments, sealants in preparation of floors, walls and ceilings, the unloading and handling of all materials to be installed and the removal of all materials in preparing floors when contracted for by the employer, shall be done only by employees covered under this Agreement.

(z) The installation of all sink-tops and cabinets, to include all metal trim and covering for same. All cork, linoleum, congo-wall, linewall, veos tile, plexiglass, vinawall tile, composition tile, plastic tile, aluminum tile and rubber in sheets or tile form and the application thereof. All bolta-wall and bolta-wall tile and similar products.

(aa) The handling and placing of all pictures and frames and the assembly of bed frames and accessories. The hanging and placing of all signage.

(bb) The installation of all framework partitions and trim materials for toilets and bathrooms made of wood, metal, plastics or composition materials; fastening of all wooden, plastic or composition cleats to iron or any other material for accessories.

(cc) The erection of cooling towers and tanks.

(dd) The setting, lining, leveling and bracing of all embedded plates, rails and angles. The setting of all stay in place forms.

(ee) Environmental: Clean room, any type of environmental chamber, walk in refrigerated coolers and all refrigerated rooms or buildings.

CARPENTER CRAFT JURISDICTION

PILE DRIVING AND CAISSON DRILLING

(ff) All unloading, handling, signaling and driving of piles, whether wood, steel, pipe, beam pile, composite, concrete or molded in place, wood and steel sheeting, cofferdam work, trestle work, dock work, floating derricks, caisson work, foundation work, bridge work, whether old or new, crib work, pipe line work and submarine work. Cutting of all wood, steel or concrete pile, whether by machine or hand; welding and cutting, peeling, and heading of all wood pile, steel sheeting and wood sheeting. The erecting and dismantling of all pile driving rigs, also derricks whether on land or water; also the moving, shoring and underpinning of all buildings. The loading and unloading of all derricks, cranes and pile driving materials. The tending, maintenance and operation of all valves pertaining to the operation of driving of pile. All diving and tending essential to the completion of jurisdictional claims.

All work done in the established yards of the Company and all work not enumerated above, shall be handled and manned as the Employer decides.

The pile driver will unload all material shipped in by rail from the point that the rail car is spotted.

All cleaning and preparation of all piling prior to driving.

The welding and attachment of all boot plates, pile points, splice plates, connectors, rock crosses, driving crosses, driving rigs, point reinforcements and overboots.

The construction, reconstruction, repair, alteration, demolition and partial or complete removal of all marine work including, but not limited to, docks, piers, wharves, quays, jetties, cribs, causeways, breakwaters, lighthouses and permanent buoys, etc. (mixing and placing of concrete excepted).

The driving and pulling of all wood, steel and concrete foundation piles and sheet piling.

The heading, pointing, splicing, cutting and welding of all piles.

The placing of all wales, bolts, studs, lagging, rods and washers including the cutting, drilling, boring or breaking of all holes or openings thereof.

The removal of all materials and/or obstructions of any nature (rip-rap included) that retard or interfere with the driving of piles or with the placing of wales, bolts and rods.

CARPENTER CRAFT JURISDICTION

This is to be subject to the discretion of the contractor who may choose to use blasting specialists or other demolition specialists.

The handling on the job of all materials used in the work.

The manning of all floating equipment (towing equipment excepted) engaged in the work enumerated, including deck engines, except machinery manned by Operating Engineers.

The placing of all rip-rap, fill stone, bedding stone, cover stone and concrete blocks in connection with marine construction. Work normally performed by Employers, such as soil tests, shoring, underpinning of buildings, cribbing, driving of sheet piling, marine divers, tenders, underwater construction workers and similar operations shall continue to be included in the jurisdiction of this Agreement.

All burning, cutting, welding and fabrication of pipe, H-beams, sheet pile (metal or wood), done on the job site or in the yard of the Employer shall be done by pile drivers. The driving of bearing piles, sheet piling with heavy equipment, caissons, pile caps, auger drilling and boring, the setting up for load testing for any type of piling, all layout and spotting for piling, caisson and boring work, all earth retention, ditch boarding, installing tiebacks.

ASBESTOS ABATEMENT CARPENTERS

(gg) All erection and maintenance of barriers and partitions used in the removing of asbestos or any abatement work. The abatement of any materials previously installed by the carpenter such as transite, ceiling and floor tiles. All operating and maintaining of current equipment used in any abatement work.

ELECTRICIAN – SOUND AND COMMUNICATION / DATA/ VOICE JURISDICTION

The installation, testing, service and maintenance, of systems which utilize the transmission and/or transference of voice, sound, vision or digital for commercial, education, security and entertainment purposes for the following: TV monitoring and surveillance, CATV and CCTV, background-foreground music, intercom and telephone interconnect, inventory control systems, microwave transmission, multi-media, multiplex, radio page, school intercom and sound, burglar alarms, low voltage fire alarm systems, low voltage master clock systems, distributed antenna systems (DAS), IP data networks, and all surface-mounted (non-power) telecommunications wiremold. Shall additionally include the installation of all raceway systems of unlimited length in telecommunications rooms, entrance facilities, equipment rooms, and similar areas. Energy management systems. Security systems; perimeter, vibration, card access, access control and sonar/infrared monitoring equipment. Communications systems that transmit or receive information and/or control systems that are intrinsic to the above listed systems; SCADA (Supervisory Control and Data Acquisition), PCM (Pulse Code Modulation), Digital Data Systems, Broadband and Baseband and Carriers, POS (Point of Sale systems), VSAT Data Systems, RF and Remote Control Systems, Fiber Optic Data Systems and Voice and Data Infrastructure and Backbone.

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. Work Under This Contract

1. **This project involves but is not limited to, demolition, partial concrete floor and ceiling repair, concrete beam repair, partial and full depth -PT, partial depth column repair, tendon-splice, expansion joint repair and replacement, crack and joint repair, miscellaneous shoring and reshores, floor surface protection sealer, traffic coatings, floor drain repair and replacement, mechanical piping and hangers, and miscellaneous architectural, electrical, and mechanical.**

2. This Contract encompasses the furnishing of all labor, materials, services, equipment, and insurance to complete the following as shown on drawing and specified herein:

3. Any premium time necessary to complete this project as scheduled, shall be included in the Base Bid.

4. All pertinent requirements of the Invitation to Bidders, Instructions to Bidders, and General Conditions shall form a part of these specifications and the Contractor shall consult them in detail for instructions pertaining to the work in the following divisions.

B. Work Performed Under Separate Contracts

1. The following will be provided by the Owner or by others under separate contracts:

   a. Temporary and final keying (see Section 087100)

   b. Tie-back, pruning, removal and/or transplanting of existing plantings

   c. Parking gate equipment and parking booth installation and wiring. Conduit installed by Contractor

   d. Departmental possessions - furniture, books, personal items, etc., shall be relocated by the Department or University as required.

2. Coordinate pickup of the following site-related, owner-provided materials from Beaumont Supply at 4080 Beaumont Rd., Lansing, MI 48910, phone: (517) 884-4880
(Hours of operation are May 1st – October 31st 6am-4pm Monday – Friday excluding university holidays. Extended hours are available with a minimum 24-hour notice. Contractor is responsible for transporting materials to the jobsite.)

a. Site Appurtenances (see Section 324000):

1) Barrier-free parking bollards, removable bollards, guard post bollards, Post and chain fence

2) Parking meters and parking meter posts

3) Parking and regulatory U-channel posts and signs

4) Building address and wayfinding signs

5) Benches, tables, litter receptacles and other site furniture

6) Bike loops and bike loop regulatory signs

C. Pre-Ordered Products

1. The Contractor shall assume full responsibility for all pre-ordered products after their arrival at MSU. This includes transportation, handling, storage, start-up, warranty services, and installation in accordance with the General Conditions unless otherwise specified.

D. Work Sequence

1. The Substantial construction completion date for this project is as specified in the Advertisement for Bids.

1.2 WORK RESTRICTIONS

A. Access Routes

1. All materials and equipment (new and demolition), including mechanical and electrical, shall be transported through a building via the designated building receiving area (usually the loading dock), and through main corridor to rooms or areas. Alternate routes may be used only with the approval of the Project Representative.

B. Owner Occupancy

1. Ramps must allow 2-way traffic at all times for access to all levels. Stage traffic topping work to allow minimum of one (1) entry/exit and access to each level open at all times. Construction work in parking Ramps shall be coordinated with IPF Project Manager, MSU Police and Parking Owner Activities (Wharton Center) Operations and Football Home Games. Impact to Parking Ramp Operations on Home Football Weekends shall be kept to a minimum, no major parking stall or access impacts unless approved by EAS Design/Construction Representative.

2. Unless otherwise stated, University buildings will continue to function and remain occupied during the construction process.

3. On every project involving new construction, additions or alterations to existing facilities, M.S.U. requires the ability of a person with physical disabilities to independently get to, enter, and use the site, facility, building or element. In no way shall a site, building or facility be restricted to individuals with disabilities, due to alterations or construction, which would normally be made accessible to individuals with no disabilities. Alternate routes for all new and alterations of existing facilities shall incorporate the latest federal, state and local barrier free standards and include temporary access accommodations for individuals with disabilities.

C. Use of Site

1. There shall be a pre-construction site walk-thru with the Project Representative to clarify and discuss limitations and concerns prior to construction.

2. Construction fence

a. A construction fence shall be placed around the construction site as shown on the drawings and as approved by the Project Representative.

b. The Contractor is responsible for installing and maintaining the construction fence and gates to restrict access by the public to the area under construction. The Contractor may be required to reposition the fence and/or gate(s) during the course of construction to accommodate the construction activities in order to minimize the inconvenience to the public.

c. The fence shall be constructed of chain link fabric with a minimum height of 6', with metal or wood posts at not to exceed 8' spacing. Fence fabric shall be supported by either a top bar or tension cable. Gates (where specified) will be constructed of a suitable metal frame with chain link fabric with a height of not less than 6'. This fence shall be installed before work commences.

d. Metal signs reading "Construction Area - Keep Out" must be attached to the fence at not more than 20' spacing and to the gate(s).

e. Where any fence crosses an existing walk, drive, or road, a lighted MDOT Type 1 barricade or larger shall be attached to the inside of the fence facing on-coming pedestrian and/or vehicular traffic.

f. No construction work, parking, storage of materials or related activities shall occur beyond this boundary fencing.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION
Not Used

END OF SECTION

SECTION 012000 - PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 PROPOSAL QUOTATION REQUIREMENTS

A. Projects to be bid will be quoted as required by the front-end documents on the specification.

1.2 ALLOWANCES

1.3 UNIT PRICES

SUMMARY

1. This section includes, but is not limited to, descriptions of the method of measurement and the basis of payment for Unit Price Work under this Contract as indicated on the Drawing, as specified herein, and necessary for the proper and complete performance of the Work.
2. Related Sections: Documents affecting work of this Section include, but are not limited to General Conditions, Supplementary Conditions, and Division 1 of these Specifications.
3. Basis of Contract Payments:
    a. Final Contract Price shall be determined by actual quantities installed at unit prices stated in the Contractor's Bid.
    b. Engineer shall determine actual as-built quantities.
    c. All work not included as Bid Item shall be considered incidental to construction.
    d. Unit price payments for individual items shall include everything necessary for such item to function as intended in the system.
    e. OWNER reserves the right to increase, decrease, or eliminate any quantities for items listed in the CONTRACTOR'S Bid or which becomes a part of the Contract Documents.
4. Work Item description for the Unit Price Work is in **Section 020010.**
5. Quantities for the Unit Price Work are included in the 'BID TABLE" (see the Bid Form Spreadsheet), located with the Bid Documents. ALL UNIT PRICES MUST BE PROVIDED FOR THE BASE BID TO BE CONSIDERED VALID.

1.4 CONTRACT BREAKDOWNS

A. Within twenty-four (24) hours after receipt of Bids, the apparent Low Bidder shall submit to the Architect/Engineer, the following:

1. A Schedule of Values (SOV), indicating the cost of each specified Division and/or Major Subdivision of the Bid. The approved SOV will be used as the basis for estimating partial payments to the Contractor when allowed per the front-end documents.

    a. All contracts shall assign a minimum of 1% of the contract value for final completion and project closeout. This item must be identified as a separate line item labeled *Closeout* on the SOV. Exceptions must be approved by the Construction Superintendent.

b. Due to changes to Generally Accepted Accounting Practices, environmental remediation must be separately reported in the Owner's financial statements. Accordingly, all contracts shall carry remediation costs in separate lines clearly marked *remediation*. These titles should not be used in other line descriptions.

c. Construction Management contracts shall carry separate detail lines for at least the following lines:

i. Preconstruction Services
ii. Construction phase staffing
iii. General conditions
iv. Bonds and Insurance. Note that subcontractor bonds are not required to be separately listed.
v. Fee
vi. Closeout

2. Identify a Subcontractor for each Division and/or Major Subdivision for the Owner's approval. Once approved, no Subcontractors will be changed without the Owner's written consent. The List of Subcontractors will have indicated the MBE/WBE Contractors and their percentages of the Contract Price as specified in the "Cover Letter" or "Advertisement for Bids" of this project.

3. A list of representatives authorized to perform Unifier functions on behalf of the Contractor using the Unifier System - Vendor Information available at http://ipf.msu.edu/index.cfm/capital-project-procedures/documents/unifier-system-vendor-information/.

1.5 CONTRACT MODIFICATION PROCEDURES

A. Change Management Quotation Requirements

1. Quotations for changes in the Contract will be submitted via Unifier when requested, as outlined in Section 012000-1.5.B, Change Management Procedures. This section will not prohibit the Project Representative from requesting and receiving verbal quotations. It is intended that mutual cooperation will keep any changes to an absolute minimum. The Contractor shall promptly document any verbal request by initiating a Change Management or Change Request record in Unifier. The Contractor shall not engage in added work without proper authorization by the Owner. Any added work the Contractor engages in without authorization shall be at the Contractor's risk. In no event shall the failure of the Construction Representative to initiate a change constitute authorization for the Contractor to proceed with work.

2. The Change Order Quotation Format Form is available on the MSU Capital Project Delivery Procedures website (http://procedures.ipf.msu.edu/index.cfm/capital-project-delivery-procedures/). This Form shall be forwarded to each required Subcontractor, and is recommended as an outline of the information required by this Contract.

3. The Contractor will submit quotations through Unifier, including detailed breakdowns. Upon request, originals of any documents shall be provided to the Owner. The Project

Representative will receive quotations from the Contractor only. Subcontractors will submit quotations through the Contractor. All Contractors will submit quotations with information and back-up data as indicated on the quotation form.

B. Change Management Procedures

1. Change Orders shall be issued as required to alter the Contract, (i.e. change the work scope, materials, dates, etc.), in accordance with the General Conditions of the Contract, and the following procedure:

a. The Contractor or the Project Representative shall initiate a Change Request in the Unifier Project Management System. Each Change Request will consist of only one change item of work.

b. Items brought up by the Department or Contractor shall be reviewed first with the Project Representative.

c. The Architect/Engineer will review the Change Request, and with the Project Representative, will determine the need for an item to be changed in the Contract by Change Order.

d. If the Change Request is approved, the Contractor will receive a request through Unifier to proceed with the work and/or provide pricing, as applicable. Provide a quotation for the item requiring change, unless the Change Request is submitted as a lump sum with a quotation attached

e. The Contractor will submit a quotation for each Change Request item in accordance with the applicable Unifier business process. Overhead and profit shall be applied consistent with the General Conditions.

f. The Project Representative and Architect/Engineer will evaluate the quotations and accept or reject each item quoted. A Change Order will be created within the Unifier system and will be issued through the MSU Purchasing Department to change the contract amount if required.

g. The Construction Supervisor or Director of Planning, Design and Construction has approval authority for the Contract Change.

1.6 CONTRACT PAYMENT PROCEDURES

A. Payment application requirements
1. Payment applications shall be submitted in Unifier, consistent with the contract documents.

PART 2 - PRODUCTS
Not Used

PART 3 - EXECUTION
Not Used

END OF SECTION

SECTION 013000 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 PROJECT MANAGEMENT AND COORDINATION

A. Project Meetings

1. Project meetings may be called as deemed necessary by the Project Manager.

B. Project Scope Documentation

1. The Contractor shall use PlanGrid for coordination of changes in the field, punch list items, and potential use for plan review comments.

C. Project Coordination

1. The Contractor is ultimately responsible for coordination to complete all work shown on drawings and specified herein independent of the location of the work on drawings and within the specifications. The arrangement of work within the specification into Divisions and Sections shall be considered as given for convenience of reference only and shall not be held to conform to jurisdictional rules which may prevail in any particular trade. It shall be the responsibility of the Contractor to so arrange or group items of work under a particular trade to conform to the prevailing customs of that trade and best interest of the Owner. Specific items of work will be performed by specific subcontractors or workmen when so specified herein or subsequently deemed necessary by the Project Representative to produce competent results.

2. The Contractor shall lay out the work and be responsible for all lines and measurements of the work. Before ordering material or executing work the Contractor shall obtain field measurements and prepare the work to fit conditions properly.

3. The Contractor will be held responsible for any error resulting from his/her failure to verify the figures shown on the drawing before laying out the work.

4. No extra charge will be allowed on account of slight variations between field dimensions and dimensions given on the drawings.

D. Mechanical and Electrical Coordination

1. Connection to Existing Equipment

a. The Contractor shall make arrangements with Planning, Design and Construction, through the Project Representative, before connecting to existing facilities. Unless otherwise noted, if interruption of service is required it shall be done at the convenience of the Owner.

1.2 CONSTRUCTION PROGRESS DOCUMENTATION

A. Construction Schedule Development/Coordination Responsibilities.

1. The Critical Path Method (CPM) will be used to plan, schedule, execute and report status of work under this contract. It shall include and properly coordinate dates for performance of all divisions for each major portion of the Work, and including completion of off-site requirements and tasks if request by Project Representative.

    a. Within fourteen (14) calendar days of the Letter of Intent or contract award, the Contractor shall develop a proposed Baseline schedule for the Work, and submit it to each subcontractor to incorporate their own work.

    b. All subcontractors, both direct and indirect, shall, within seven (7) calendar days of receipt of the Contractor's Schedule, submit revisions, comments and feedback to the Contractors, which shall be incorporated into the proposed schedule.

    c. Upon receipt of the schedule from the Subcontractors, the Contractor will incorporate Subcontractors information into the Baseline Construction Schedule with appropriate logic ties and Contract Milestones, and distribute to the Architect/Engineer and Owner within seven (7) calendar days. Thus the Contractor Schedule development will be completed within twenty-eight (28) calendar days from Letter of Intent or Contract, awaiting Owner approval.

    d. After project schedule has been accepted by the Owner the Contractor within five days (5 days) schedule a meeting with all subcontractors to review and encourage schedule compliance.

2. **All Subcontractors shall cooperate with the General Contractor to prepare and maintain the Construction Schedule, which shall include, without limitation, the following information at the General Contractor request.**

    a. Shop Drawing review and approval, product procurement, fabrication, shop inspection, and delivery dates including lead times. Note: A/E shall be given 14 days upon receipt of submittal to review and return submittal.

    b. Each phase of the Work, including the Punch List, Project Closeout requirements, Contract Completion and Occupancy;

    c. Milestone dates that are required by the Contract Documents and Progress Milestones. Milestones should typically be based on the critical path and not exceed one (1) month between milestones.

    d. The critical path of the Work

    e. Planned disruptions and shutdowns due to other operations, facilities and functions, if any.

3. Upon receipt of the proposed Construction Schedule, the Architect/Engineer (A/E) and Owner (or other designee of the Owner), shall review the Construction Schedule and submit a copy of the Construction Schedule with comments to the Contractor within seven (7) calendar days. Within five (5) calendar days of review of comments from the Owner, all requested changes shall be incorporated in to the baseline Construction Schedule and a printout and electronic copy shall be provided to the Owner. Thus, the Contractor Schedule development with Owner review and Contractor modifications/changes shall not exceed forty (40) calendar days from the Letter of Intent.

4. **No progress payments will be made to the Contractor without a Baseline Construction Schedule approved by the Owner (or other designee of the Owner).**

5. Unless otherwise specified in the Contract Documents or waived in writing by the Owner, the Contractor shall provide **monthly progress reports, at a minimum,** to the Architect/Engineer and the Owner, which shall include recommendations for adjusting the construction schedule to meet Milestone Completion dates and contract completion dates.

6. An updated construction schedule shall be submitted each month to the Project Rep. The Project Rep shall review the submittal, provide comments as necessary. No **payment will be made without an updated construction schedule approved by the Project Representative.**

7. When it is apparent to the contractor and A/E that critical path activities, scheduled Milestone completion dates, or contract completion dates will not be met, the Contractor shall submit to the Owner for review and approval, a plan to avoid or minimize any delay. Such a plan may include, without limitation, increasing the Contractor's workforce; increasing the number of working hours per shift, shifts per workday, workdays per week, the amount of construction equipment, and rescheduling of activities, or any combination thereof; to achieve maximum practical concurrency of work efforts and eliminate the cause of such delay. The Contractor agrees that such actions as described in this paragraph or other action deemed necessary by the Contractor will be taken promptly and without additional cost to the Owner.

8. Any request for time extensions or damages due to delay will only be considered where it is proven by the Contractor, using acceptable scheduling techniques, that the project's contractual intermediate milestones or contract completion dates have been directly impacted by the alleged issue causing the delay. This does not preclude the Contractor's right to finish the Project early. It does explicitly establish the condition upon which the Contractor shall be entitled to request time extensions or delay damages.

B. Construction Schedule Technical Requirements

1. A simple bar chart construction schedule shall be prepared by the Contractor an initially submitted to the Owner prior to or at the first Pre-Construction Meeting.

2. The Construction Schedule shall include without limitation, milestones, shop drawing

submittals with time allowed for Owner approval, procurement and construction of all major items of work, depicted in weekly increments.

3. The Contractor shall submit updates to the Construction Schedule on no less than a monthly basis and shall submit updates with each Application for Payment, as required by paragraph 3.10 of the Conditions of the Contract.

4. The Contractor shall coordinate its work with the Owner and other Subcontractors and shall cooperate with other Subcontractors by utilizing orderly progress toward completion in accordance with the work scheduled.

1.3 MILESTONE SCHEDULE REQUIREMENTS

A. The following Milestone Schedule dates for the listed work are provided as part of the contract requirements.

MILESTONE ACTIVITY	START	COMPLETION
Substantial Completion	**Upon Contract**	**08/16/2024**

1.4 SUBMITTALS

A. Submittal Schedule

1. Concurrently with the development of the Contractor's Construction Schedule, the Contractor shall prepare a complete schedule of submittals. Submit the initial Submittal Schedule along with the Construction Schedule, at, or prior to, the Pre-Construction Conference.

a. Coordinate the Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products, as well as the Contractor's Construction Schedule.

b. Prepare the schedule in chronological order. Provide the following information:
- Scheduled date for the first submittal
- Related section number or specification number
- Submittal category (Shop Drawing, Product Data, Calculations, Test Results or Samples.
- Name of the subcontractor
- Scheduled date for resubmittal
- Scheduled date for completion of the A/E's review

2. Distribution: Following the Owner's response to the initial submittal, print and distribute copies to the Project representative, A/E, Owner, subcontractors, suppliers and other parties required to comply with the submittal dates indicated. Keep copies at the Project Site at all times.

a. When revisions are made, distribute to the same parties and post at the same locations. Delete parties for distribution when they have completed their assigned

portion of the Work and are no longer involved in construction activities.

3. Schedule Updating: Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting, or as requested by the Project Representative.

B. Submittals are required for, but are not limited to, each of the following. The Contractor should refer to each of the following referenced sections for additional requirements of each submittal. All submittals are to be processed electronically using Unifier.

1. GENERAL SUBMITTALS
Section 012000 for Contract Breakdowns
Section 017000 for FADE Log

2. AS-BUILT DRAWINGS
As-built Drawings are required as specified in Section 017000.

3. CERTIFICATES OF INSPECTION
Certificates of Inspection are required as specified in Section 017000.

220500 for Plumbing Permits and Inspection
260500 for Electrical Permits and Inspection

4. OPERATION AND MAINTENANCE DATA
Operation and maintenance data is required as specified in Section 017000.

5. GUARANTEES
Guarantees are required as specified in Section 017000.
Manufacturer Maintenance Agreement
Applicator Agreement
Sealants
Expansion Joints Assemblies

6. SAMPLES
Samples are required as specified in Section 013000 for the following items:
Sealants
Traffic Coatings
Caulk Sealants
Expansion Joint Assemblies

7. SHOP DRAWINGS
Shop drawings are required as specified in Section 013000 for the following items:
- Concrete Mix Design
- Restoration Materials
- Traffic Coatings

- Expansion Joint Materials
- Paint
- Sealants
- P/T Coupling Materials

8. TEST AND BALANCE REPORTS
   Test and balance reports are required as specified in TESTING, ADJUSTING, AND BALANCING FOR HVAC, Section 230593.

C. Shop Drawings and Samples

1. The Contractor shall review, stamp with their approval, and submit via the Unifier Submittal process to the Project Representative all Shop Drawings and Samples asked for in these specifications, or deemed necessary by the Architect/Engineer.

2. Work will not begin on any item requiring Shop Drawings or samples until the Contractor receives approval in writing from the Architect/Engineer. Any material or item, ordered or fabricated prior to final approval shall be at the Contractors' risk. No changes shall be made on the approved drawings or samples without the written consent of the Architect/Engineer. Each Shop Drawing or Sample shall be properly identified as to MSU project title and number, Contractor, item, etc., with cover sheet, stamp, tag, etc., so as not to be confused with any other. The Contractor shall direct specific attention with written explanation to any deviation from what is specified or shown on the drawing.

D. Shop Drawings

1. The Shop Drawing will be identified by job name, date, Contractor name and name of person reviewing for compliance with Contract Documents. Shop Drawings are drawings, diagrams, schedules and other data specifically prepared by the Contractor to illustrate some portion of the Work for which submittals are required by the Contract Documents. The purpose of their submittal is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents.

2. The Contractor shall review for compliance with the Contract Documents, approve and submit to the Owner all Shop Drawings required by the Contract Documents. Submittal shall be with reasonable promptness and in such sequence as to cause no delay in the Work or in activities of the Owner or their separate Contractors. Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor may be returned by the Owner without action.

3. By approving and submitting Shop Drawings the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

4. The Owner will review and approve or take other appropriate action on the Shop Drawings submitted by the Contractor only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Review of Shop Drawings 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 Owner's review shall not constitute approval of safety precautions or, unless otherwise stated by the Owner, of any construction means, methods, techniques, sequences or procedures. The Owner's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

E. Samples

1. Samples shall be submitted as directed to provide a representative sample. Samples shall be physical examples, from the actual materials, to be used whenever practical. All packing and transportation charges on samples shall be paid by the Contractor.

2. A Submittal record shall be created in Unifier for each sample, indicating the manufacturer and specifications, and informing the Owner of the status of delivery of the physical sample. The physical sample will be retained by the Owner. The Submittal record will be returned to the Contractor with a review status by the Owner.

3. Approval of Samples shall be generally for quality, color, and finish, and shall not modify the requirements of any of the Contract Documents as to dimensions or design.

1.5 SPECIAL PROCEDURES

A. Constructor Safety Requirements

1. MIOSHA regulations apply to all university projects. Each constructor is responsible for ensuring compliance with "all applicable requirements" that govern their work, including any additional regulations, interpretations, clarifications, and consensus standards incorporated therein by reference.

2. MSU-specific safety requirements are published in the Constructor Safety Requirements Manual. The most current version of this manual is available at http://www.ehs.msu.edu/contractors. Constructors will be held to the version of the manual in effect at the time of contract execution.

3. Requirements specific to work at Michigan State University generally fall into one of two categories:

    a. Administrative Requirements, such as but not limited to communication, planning, documentation, submittals, notifications, reporting, and inspections.

b. Safety Requirements unique to work at MSU, such as but not limited to Control of Hazardous Energy/Lock Out Tag Out, Confined Space, Electrical, Excavations, Fall Protection, Hot Work, etc.

4. Constructor shall submit a Site-Specific Safety Plan or work under an existing Area-Specific Safety Plan where allowed, as described in the MSU Contractor Safety Requirements Manual.

B. Hazardous Materials

1. If the Contractor suspects a material, preexisting or newly discovered, within the scope of this project to be a hazardous material such as, asbestos, lead, polychlorinated biphenyl or any other potentially hazardous material, that has not already been identified and/or in the scope of work for the Contractor to abate, notify the Project Representative immediately. Do not impact or disturb the material in question until it has been determined to either be non-hazardous, included in the original scope of work, or until other arrangements can be made with the project representative and the MSU Department of Environmental Health and Safety (EHS).

2. Due to the age of buildings on the Michigan State University campus, all coated surfaces shall be assumed to contain lead-based paint. This includes but is not limited to any type of paint, primer, coating, lacquer, or varnish on any building component. Proper precautions must be taken to ensure that workers and building occupants are not exposed to airborne lead concentrations at or above the OSHA Action Level (AL) of 30 ug/m3.

3. If work will be conducted on any coated surface at MSU, the contractor must submit to the Department of Environmental Health and Safety (EHS) and Infrastructure Planning and Facilities Project Representative current proof of appropriate detailed written lead work plan in accordance with 29 CFR § 1926.62 (Michigan Part 603). This submittal will include proof of training, written respirator program, and negative exposure assessments from projects with similar conditions at a minimum. Contractors performing work on campus must follow the provisions of the MSU Lead Management Program from EHS.

4. Any work that impacts Lead shall comply with the provisions of the MSU EHS Lead Management Plan.

5. Any work that impacts Asbestos shall comply with the provisions of the MSU EHS Asbestos Management Plan.

1.6 Requests for Information

A. Requests for Information (RFI's) shall be processed within Unifier, using the RFI business process. Failure to complete the tasks within the Unifier time frames shall not be a basis for a delay claim.

PART 2 – PRODUCTS
Not Used

PART 3 – EXECUTION
Not Used

END OF SECTION

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 REGULATORY REQUIREMENTS

A. Applicable Codes, Standards, and Regulations

1. The following list of codes and regulations, establish the minimum requirements applied to work done at MSU. Where the specifications or plans, exceed the applicable code, the specifications and plans shall be followed.

a. NFPA National Fire Codes.
b. NFPA National Electrical Code.
c. ICC International Building Code.
d. ICC International Plumbing Code.
e. ICC International Mechanical Code.
f. State of Michigan Elevator Safety Act - Act 227, P.A. 1967.
g. State of Michigan Boiler Act - Act 290, P.A. 1965.
h. State of Michigan Construction Code Act - Act 230, P.A. 1972, as amended.
i. State of Michigan Occupational Safety and Health Act - Act 154, P.A. 1974, as amended.
j. Americans With Disabilities Act (ADA) Public Law 101-336.
k. Regulations of Air Pollution Control Commission State of Michigan, and the Federal Clean Air Act (42 U.S.C. 1857C - 8 © (1)).
l. Soil Erosion and Sedimentation Control - Act 451 of 1994, parts 31 and 91, as amended.
m. Environmental Impact Statement Executive Order 1974-4.
n. State Fire Safety Board's New Rules for Schools, Colleges, and Universities.
o. State of Michigan Safe Drinking Water Act, P.A. 339 of 1976, and Federal Water Pollution Control Act (33 U.S.G. 1319 ©).
p. State of Michigan Energy Code (Adopting ASHRAE 90 by reference).

1.2 REFERENCES

A. Abbreviations and Symbols

1. AIA - American Institute of Architects
2. ACI - American Concrete Institute
3. AISC - American Institute of Steel Construction
4. ANSI - American National Standards Institute
5. ASTM - American Society for Testing Materials
6. BOCA - Building Officials and Code Administrators
7. LEED - Leadership in Energy and Environmental Design
7. NFPA - National Fire Protection Association
8. OSHA - Occupational Safety and Health Act
9. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
10. MDOT - Michigan Department of Transportation

11. USGBC - U.S. Green Building Council

1.3 QUALITY CONTROL

A. Testing Laboratory Services

1. All work (materials and installation procedure) shall be tested and inspected by an independent testing and inspection agency, approved by the Project Representative to provide the quality control requirements in accordance with these specifications. Results of these tests and inspections when performed in accordance with these specifications will not be disputed by either party. Failure of the Contractor to provide quality control in accordance with this specification may result in the replacement of the work at the Contractor's expense.

B. Contractor's Responsibilities

1. Submit the name of the proposed testing and inspection agency(s) to the Project Representative for review and approval prior to contracting for such services.

2. Employ and pay the cost of independent testing and inspection as required in this specification. Pay applications from the testing/inspection agency shall be reviewed by the Owner before the Contractor's pay request for testing/inspection services is approved.

3. Advise the testing and inspection agency sufficiently in advance of the work to be inspected in the field to allow time to schedule personnel and equipment to perform the required inspections. Failure of the work to be inspected shall be the sole responsibility of the Contractor regardless of the fault of the testing and inspection agency.

4. Furnish certificates to authenticate the type and or quality of products furnished for installation as required in these specifications.

5. Shall notify the Project Representative in a timely manner when and where testing is to take place to provide sufficient time for the Project Representative to be in attendance.

C. Testing & Inspection Agency Responsibilities

1. Perform all testing and inspection of the work in accordance with these specifications.

2. Furnish qualified personnel and sufficient equipment in a timely manner when required by the Contractor and/or Project Representative to perform all testing and inspection in accordance with these specifications.

3. Provide written reports (2 copies) in a timely manner of the work tested and inspected. The reports shall include complete material test results and for in-place material, a sketch showing the exact location where the test was taken on the project site.

4. The inspection and testing agency and its representatives are not authorized to revoke, alter, relax, enlarge or release any requirements of the Contract Documents, nor to approve or accept any portion of the work.

5. Work will be checked by representatives of the testing agencies as it progresses, but failure to detect any defective work or product will not in any way prevent later rejection when such defect is discovered, nor will it obligate the Owner to final acceptance. When it appears that the work or product furnished is in non-conformance with the Contract Documents, the representative of the testing agency will direct the attention of the Project Representative and Contractor to such non-conformance.

6. Quality control testing items shall include the following:

   c. Concrete testing

D. Authority of the Project Representative

1. May order additional tests and inspection beyond those required, if in their opinion, the subject work may not meet specification. The costs for these tests and inspections shall be borne by the Contractor.

2. May terminate the testing and inspection agency. The Contractor shall then furnish to the Project Representative the name of an additional agency for approval.

3. May perform quality control tests and inspections.

PART 2 - PRODUCTS
Not Used

PART 3 - EXECUTION
Not Used

END OF SECTION

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1- GENERAL

1.1 TEMPORARY UTILITIES

A. General

1. The Contractor for the general construction work shall be responsible for all items specified in Section 015000. The Contractor shall install and maintain all items until project is finished and shall remove same and restore areas to their original conditions.

B. Temporary Electricity

1. The Contractor may use any permanent electrical outlets in the construction area.

2. Construction lighting shall be turned off during unoccupied periods, with the exception of lighting required for safety reasons such as path of egress.

3. Temporary service for heavy loads, or where no other service is available, will be provided by the general Contractor at the Contractor's expense. Power for temporary service connected to public utility company lines, (before an MSU service meter) will be paid for by the Contractor. Power for temporary service connected to the MSU power system, or after an MSU service meter, will be furnished by the Owner at no charge.

4. The contractor shall install temporary lighting within the construction area consistent with MIOSHA requirements.

C. Temporary Heat

1. All equipment and labor for temporary heat shall be furnished by the Contractor. Use of University utilities for temporary heat will be at the discretion of the Owner. The cost of natural gas or steam for heating new structures or other applications requiring temporary heat will be paid by the Contractor.

D. Temporary Telephone Service

1. If there is no University phone at the immediate work site, the Contractor shall provide a temporary job site telephone and/or provide the Job Superintendent with a phone activated paging device or cell phone.

E. Temporary Water

1. Each Contractor may use water for construction purposes from the nearest University source.

F. Temporary Sanitary Facilities

1. A toilet in the work area may be used by the Contractor's employees.

2. Where there is no toilet in the work area, an approved chemical type portable toilet will be provided by the Contractor.

1.2 VEHICULAR ACCESS AND PARKING

A. Parking Regulations

1. Unless otherwise directed, all non-University personnel working on the Campus of Michigan State University are required to park as Visitors. Between 7:00 a.m. and 6:00 p.m., Monday through Friday, Visitors may park only in metered parking spaces or gate controlled parking lots.

2. Commercial permits are available from the Department of Police and Public Safety (355-8440), which will allow parking in specific areas. The cost of a commercial permit is the responsibility of the Contractor.

3. Permits for one day parking in areas reserved for university employees are available to Contractors or their personnel from the Department of Police and Public Safety at the current rate, with a signed note from the Project Representative.

4. Parking permits are not required for vehicles south of Mount Hope Road.

1.3 TEMPORARY BARRIERS AND ENCLOSURES

A. General

1. The Contractor shall provide, install, and maintain necessary temporary barriers, warning signs, and other safety measures to protect the public, property, and plant growth.

2. The Contractor will be required to work within limitations imposed by the University Police and Public Safety Department with respect to vehicular and pedestrian traffic. When approved by the Owner, if it becomes necessary to occupy a traffic lane for **ANY** length of time, proper directional signs, flashers and barricades shall be provided at the Contractor's expense in accordance with the most recent edition of the Michigan Manual of Uniform Traffic Control Devices. The Contractor will replace if damaged or stolen, all barricades, flares, and night protection at Contractor’s expense, all being considered as incidental to the work.

B. Dust Control

1. Temporary Partitions

a. The Contractor shall construct necessary temporary partitions to isolate the new work from the existing building.

b. Unless noted otherwise, construct partitions of 2” x 4” wood studs, 16” on center and heavy mil, fire retardant plastic sheeting securely attached so as to keep dust, dirt, and debris from spreading beyond the work area.

2. Return Air Openings

a. The Contractor shall block all return air openings in the work area so that dust will not carry into other areas of the building.

3. Site Dust

a. The General Contractor shall be responsible for eliminating airborne dust in the work area and staging area by application of appropriate mitigation measures, as approved by the Owner.

C. Security Measures

1. Temporary & Access Keying

a. The MSU Infrastructure Planning and Facilities Key Shop will furnish construction keys, and furnish and install construction cores for use during construction as deemed necessary by the Project Representative. The Contractor may pick up the construction keys at the Key Shop with the form, "Authorization for Construction Cores and Keys," completed and authorized by the Project Representative.

b. All construction keys and facility keys issued to a Contractor for a particular project will be returned to the Project Representative before final payment will be processed. If keys are not returned, the Contractor may be held responsible to pay for re-keying any and all affected facilities.

2. Campus Security and Access Control System

a. When deemed necessary by the Project Representative, temporary security access cards will be issued to the Contractor for building exterior doors, rooms, and/or spaces that are secured by the Campus Security and Access Control System.

b. On construction projects where the security system is active and armed during construction the Contractor will be assessed a false alarm fee for any unauthorized entry of a secure space and/or setting off an alarm by propping open secured doors/windows, cutting into the security wiring, removing security devices, or any other action causing an alarm.

c. The false alarm fees shall be as follows:

First occurrence	No assessed fee
Second occurrence	$500
Third and subsequent occurrences	$1,000 each

d. The breaches of security and associated fees shall be assessed by project to the Contractor, not by sub-contractor, vendor, supplier, etc.

D. Campus Woody Plant Protection

1. Coordinate all plant protection and site work limits with the Project Representative. SITE WORK CANNOT COMMENCE WITHOUT A PRE-CONSTRUCTION WALK-THROUGH.

   All Contractor employees engaged on the project site shall attend, or are expected to have attended, the Contractor Woody Plant Protection Seminar, hosted by MSU's Landscape Services (formerly Grounds Maintenance) Division. This seminar will be presented on an annual basis at a minimum. Coordinate with the Project Representative for times and locations of the seminar(s).

2. Work by Owner

   a. Tie-back of existing plantings. Pruning, thinning, and sealing of existing plantings. Root pruning and root protection of exposed roots. Watering of existing trees under stress. Salvaging of existing small trees, shrubs, and other plant growth that the Owner wishes to retain.

3. Protection of Plantings

   a. Protect existing trees and other vegetation indicated to remain in place. Prohibited practices include breaking of branches, scraping of bark, or unauthorized cutting; nailing or bolting into trees or plants; use of trees or plants as temporary support (i.e. for cables); unauthorized filling, excavating, trenching or auguring within the root zone; compaction/driving over the root zone; (see definitions below), storage of any materials or vehicles within the root zone; dumping of construction waste or materials (including liquids); unauthorized removal or relocation of woody plants; removal of tree protection barricades or construction fencing prior to completion of project.

   b. Compaction within the root zone is the increasing of the soil density caused by heavy equipment or concentrated foot traffic which significantly alters the soil conditions from that which was present prior to construction.

   c. The root zone of a tree is one and a half the distance of plant crown drip line outward from the stem, along undisturbed grade. Should placement of concrete be specified or authorized by the Owner within the root zone, a sulfur application

will be applied by the Owner. The Contractor shall notify the Owner at least 48 hours prior to pouring concrete. Trees to receive sulfur shall be identified by Owner.

d. Tree protection barricades shall be wood rail fencing constructed of 4" x 4" x 11' posts, at 8' maximum o.c. and two 2" x 6" wood rails, lined with snow fence (or similar approved construction barrier fencing) which meets existing grade. Standard fence height shall be 8'; for variations see site drawings. Failure to install barricades as directed may halt work. Plant damage occurring within installed barricades does not absolve the Contractor from damage assessment.

e. All tree protection shall be installed prior to the beginning of construction and continually maintained. Tree protection shall not come in contact with anything except the construction fence, when shown on the drawings.

4. Damage

a. Damage to campus woody plants shall include any of the items indicated in paragraph 2.a above as determined solely by the Owner. The Owner shall evaluate damage and establish proportional fines up to 100% of the value shown below, regardless of the current disposition of the plant.

b. 100% Value Schedule for Campus Trees

1" - 3" caliper	$200/inch
3" - 6" DBH	$290/inch
6" - 9" DBH	$380/inch
9" - 12" DBH	$480/inch
12" - 15" DBH	$670/inch
15" DBH or greater	$960/inch

c. DBH is the tree trunk diameter at breast height.

d. Replacement value for shrubs, vines, and perennials shall be assessed at three times the current market cost of the plant.

e. Alternatives to the above protective measures, or any variations, must be approved by the staff Landscape Architect and the Project Representative. (Measures may include: thinning and root pruning, fertilization, aeration, boring & jacking, hand excavation, supervision by campus arborist, seasonal schedule recommendations.) Alternatives would be based on the specific requirements of the plant species in question, as determined by the staff Landscape Architect.

1.4 TEMPORARY CONTROLS

A. Soil Erosion and Sediment Control (SESC)

1. The Contractor shall comply with all Contract Documents, approved SESC plans,

permit conditions and with Parts 31 and 91 of Public Act 451 of 1994. The Owner shall obtain a Soil Erosion and Sedimentation Control (SESC) permit from the appropriate Municipal (MEA) or County (CEA) Enforcing Agency. Permit Fees and MEA/CEA routine inspections will be paid for by the Owner.

2. Prior to beginning any earth change, the Contractor shall retain a DEQ Certified Storm Water Operator (CSWO) to provide the required SESC reports (which include the weekly and storm event reports as well as all follow up reports for both violations and storm event corrections) on the standard DEQ form. The Contractor shall provide the reports to the Owner on a weekly basis, and retain those reports for 3 years.

3. Prior to beginning any earth change, and during the life of the contract, the Contractor shall install and maintain all temporary SESC measures as shown on the Contract Documents, SESC plans, and as directed by the Owner, CSWO, DEQ, or MEA/CEA, until MSU officially takes over responsibility for the site.

4. Immediately prior to MSU taking responsibility for the site, the Contractor:
   a. Will be required to clean all catch basins affected by the construction, both within the Contract Limits and all surrounding roads and lawn areas when soil may have spread as the result of construction activities.
   b. Shall put all temporary SESC measures in satisfactory condition as determined by the CSWO.

5. All temporary SESC measures will remain in place and will become the property of the Owner when responsibility for maintaining the SESC measures becomes the Owner's responsibility.

6. The Contractor shall conduct all excavation, filling, grading and clean-up operations in a manner such that sediment generated by wind or water is not discharged off site or into any storm sewer, drainage ditch, river, lake, air or underground utility system. Stage the work per plan to minimize the area of exposed soil, thereby reducing the opportunity for soil erosion.

7. Water from trenches and other excavation shall be passed through an approved filtration bag to remove sediments from the water before it is released into the storm water drainage system.

8. If sediment extends beyond the project limits, the Contractor shall be responsible for cleanup and restoration of all surfaces and utility systems to the condition that existed prior to the Contract award.

9. All SESC measures shall be maintained daily.

10. Should violations (irrespective of a fine being assessed) be identified by the Owner, CSWO, MEA/CEA or DEQ, they shall be corrected within 24 hours of notification. The correction(s) shall be approved by the Owner, CSWO, MEA/CEA or DEQ. All subsequent inspections performed by the Owner, CSWO, MEA/CEA or DEQ as a

result of the violation (and any other associated costs) will be paid by the Contractor. If identified violations are not corrected within 24 hours of written notice, the Owner shall have the right to make necessary repairs at the Contractor's expense, without being required to provide further notice to Contractor.

11. Fines assessed as a result of the violation for non-compliance of the SESC provisions, will be paid by the Contractor. If a "Stop Work" order for non-compliance is issued, a time extension request for that time period will **not** be granted. (Fines could be assessed up to and including $25,000/DAY for each violation.)

12. Only one Seven Day Notice will be issued for violations of the SESC provisions. Should subsequent violations be identified, the contractor will be expected to make the satisfactory correction within 24 hours of notification. Should the corrections not be made, the Owner, without further notice to the Contractor, will correct the violation. The cost of the corrective action will be charged to the Contractor.

1.5 CONSTRUCTION DEBRIS CONTROL

A. The Contractor shall provide and administer a system for disposal of construction debris, and shall be responsible for seeing that the site and the new building are at all times free of accumulated debris caused by the construction. For purposes of this paragraph, debris shall include ALL materials used in construction including construction roads and pads. Special attention should be given to materials that could leach into the ground, including but not limited to lime based materials, all chemicals, and any liquids except clean water.

B. The Contractor shall comply with LEED Materials & Resources Credit 2, including documentation of the Construction Waste materials recycled, reused and sent to the landfill, using the Construction Waste Management form and process provided by the Owner in Unifier. This form shall be submitted monthly, and will be generated from completed payment applications. Negative reports are required.

C. This shall include, but not be limited to, rubbish containers conveniently located throughout the site for the daily disposal of debris directly into them from each work location. Debris shall not be allowed to accumulate on the ground through-out the site overnight.

D. All combustible debris shall be removed to a solid waste disposal site properly licensed under Act 87 of the Public Acts of 1965 of the State of Michigan.

E. No burning of debris will be permitted on the Project site or elsewhere on the Owner's property.

F. Should the Contractor not execute the work required in this section, the Owner reserves the right to perform the work by other forces and deduct the cost from the contract price.

1.6 CONFINED SPACES

A. The workplace may contain permit confined spaces and entry is allowed only through compliance with a confined space program as defined by 29 CFR 1910.146. The contractor

is responsible for assessing real or potential atmospheric hazards and other serious safety and health hazards in the confined space. MSU will make available records of known confined space hazards. The contractor shall provide all necessary equipment for confined space entry. If MSU personnel will be working in or near confined spaces occupied by the contractor, the contractor is required to coordinate activities with the Project Representative. The contractor will inform the Project Representative of procedures followed and hazards confronted or created during entry operations.

1.7 LOCK-OUT/TAG-OUT PROCEDURE

A. The Contractor shall conform to Michigan State University Infrastructure Planning and Facilities lock-out/tag-out procedure. Copies are available from Planning, Design and Construction, Infrastructure Planning and Facilities Building, Michigan State University.

1.8 FM RED TAG PERMIT MONITORING SYSTEM

A. When working on fire protection sprinkler systems the Contractor shall conform to the Factory Mutual Red Tag Permit Monitoring System modified by notifying the Project Representative in lieu of the Emergency Organization, Public Fire Department, and Factory Mutual. Documentation is available from Factory Mutual, (781) 255-4359.

1.9 FM HOT WORK PERMIT SYSTEM

A. For all hot work operations, the Contractor shall conform to the Factory Mutual Hot Work Permit System modified by notifying the Project Representative in lieu of the Fire Safety Supervisor and Factory Mutual. Documentation is available from Factory Mutual, (781) 255-4359.

1.10 HAZARDOUS SUBSTANCE SPILLS

A. Releases of hazardous substances that pose a significant threat to health and safety, or that, by their very nature, require more than a routine response, are emergency situations. If a release of an emergency nature occurs, call 911 immediately. Provide all applicable information and stay on the phone until told to hang up. If a non-emergency release of a hazardous substance occurs, contact the MSU Infrastructure Planning and Facilities Project Representative immediately.

1.11 ROOF PROTECTION

A. In the event a roof has to be used as a storage, work and/or walkway area, the following protective measures shall be employed.

1. The size and location of the storage, work or walkway areas shall be approved by the MSU Infrastructure Planning and Facilities Project Representative.

2. The storage, work or walkway area protection shall consist of a 1-inch layer of water resistant insulation such as EPS, and a layer of ½ inch plywood. Stagger the seams of

the insulation and plywood; use plywood clips to prevent cupping.

3. The perimeter of the area shall be lined with barricades and warning tape to ensure that all traffic will stay on the protected areas.

1.12 CRANE HOISTING

A. Crane hoisting of equipment or materials over occupied spaces shall be performed at the convenience of the Owner, with arrangements made by the Project Representative.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Storage and Protection

1. The Contractor shall be responsible for work, material, and equipment until finally inspected, tested, and accepted. The project shall be protected against theft, injury, and damage. Material and equipment received on the site shall be carefully stored until installation.

B. Staging Area

1. Should the Contractor require exterior staging or on-site storage of materials - the location of this area must be agreed upon prior to actual use of the space by the Project Representative and the Contractor. The area will not be within the drip-line of any tree or in plant beds, as per Section 015000.1.3.D.3.

2. If this exterior area is outside the fenced project site, the area shall be enclosed with a minimum 4' high welded wire fence, with metal fence T-posts not exceeding 8' on center. Fence fabric shall be supported by either a top bar or a tension cable.

3. The Contractor shall be responsible for the cost of placing and removing the fence.

4. Each designated area shall have only one access route from the road or drive.

5. The area is not to be used for employee parking, but may be utilized by the Contractors' vehicles and equipment necessary to service the project.

6. Any areas damaged as a result of the staging operation shall be repaired by the Contractor, at no additional cost to the Owner.

PART 2 - PRODUCTS
Not Used

PART 3 - EXECUTION
Not Used

END OF SECTION

SECTION 017000 - EXECUTION REQUIREMENTS

PART 1- GENERAL

1.1 EXAMINATION

A. Pre-Bid Site Inspection

1. Each Bidder shall be held to have visited the site of the proposed work before submitting their proposal and to have familiarized themselves with all existing conditions affecting the execution of the work in this project. No allowance or extra consideration on behalf of the Contractor or Subcontractor will subsequently be made by reason of failure to observe the site conditions.

1.2 PREPARATION

A. Protection of Work and Property

1. Contractor shall protect existing and new work as required by this construction or as requested by the Project Representative.

2. Interior Protection

a. This will include, but not be limited to the wall, floor, and ceiling finishes to remain at the construction site, along the access route to the site, existing elevators, and other areas such as roofs and mechanical rooms where related work is specified or required.

3. Exterior Protection

a. The Contractor shall be responsible for any damage to existing facilities, including but not limited to the following: buildings, trees and shrubs, walks, roads, utility systems, terraces and steps, lights, and unreasonable turf damage as determined by the Project Representative. Damage shall be repaired by the Contractor in accordance with MSU's Construction Standards at no cost to the Owner.

b. No crawler cranes, bulldozers, or other equipment, fitted and running on steel treads, shall be permitted to traverse any walk, road, street, or other thoroughfare on the Campus of Michigan State University. Where it is necessary to unload such equipment on these thoroughfares, and when approved by the Project Representative, planking shall be provided to protect same. If this is not done, and damage is observed, the cost of replacing shall be the burden of the Contractor causing such damage.

c. Staging zones for materials and equipment shall be coordinated with Project Representative. They are to be placed on paved areas where possible. Set-up and storage areas shall be fenced with minimum 6-foot high pedestal-type chain link fencing. Locations shall be reviewed with the Department of Police and Public

Safety and approved by the Project Representative.

d. Crane hoist dates shall be coordinated with Project Representative for sufficient notice to building users. Project Representative shall direct the notice to the building users and coordinate with DPPS.

e. Owner may provide temporary access-ways in turf or root zone areas, as determined in pre-construction walk-through. For heavy equipment on turf areas, Alturna mats or approved equal, must be utilized for travel and set-up zones.

f. All electric, telephone, and steam vaults and water valves shall be protected and remain accessible at all times. Heavy equipment shall not be run over the top of vaults or valve boxes, nor shall materials be stored over them.

g. Contractor shall provide lighted barricades if building entrances or pedestrian walks are closed after work hours or on the weekends.

h. Tree pruning, plant tie-back, and vine removal shall be done by the Owner, as coordinated with the Project Representative, and as noted in Section 015000.1.3.D.2.a. Trees or other plant material shall not be used as anchor points for any lines or equipment.

i. Plant protection as directed by the Project representative:

a. Minor work: Plants adjacent to, or below work zones are to be washed off daily. In no case shall masonry dust or other construction debris remain on plants for more than 24 hours.
b. Major work: Plants adjacent to, or below work zones are to be covered with breathable woven mesh tarp. Tarp shall be removed at the end of each day and debris disposed of. Debris and dust shall not be absorbed into soil.

B. Field Engineering

1. Quality Assurance

a. Surveyor

1. Engage a Registered Land Surveyor, registered in Michigan, to perform ALL project surveying, including construction layout, as outlined in Section 017000-1.2.B, "Field Engineering."

2. Submittals

a. Project Record Documents

1. Upon completion of Work requiring Field Engineering, submit a record of Work performed and record survey data as required in Section 017000-1.2.B.5.

2. Upon completion of Work requiring Field Engineering, submit a certificate signed by the Registered Land Surveyor, certifying the location and elevation of improvements comply with the Contract Documents.

3. Control Points

   a. The Owner will identify existing control points and property line corner stakes.

   b. Verify layout information shown on the Drawings in relation to the property survey and existing benchmarks before proceeding to lay out the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.

   c. If a discrepancy between the contract drawings and the existing site is found, contact the Project Representative for a resolution BEFORE any actual layout of the work is begun.

   d. Do not change or relocate benchmarks or control points without prior written approval. Promptly report lost or destroyed reference points, or requirements to relocate reference points because of necessary changes in grades or locations.

   e. Promptly replace lost or destroyed control points. Base replacements on the original survey control points.

   f. Establish and maintain a minimum of two permanent benchmarks on the site, referenced to data established by survey control points.

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

   h. The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction.

   i. Prior to construction, verify the location and invert elevation at points of connection to existing utilities.

4. Benchmarks and Markers

   a. Working from lines and levels established by the property survey, establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as needed to properly locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do no scale Drawings to determine dimensions.

   b. Advise entities engaged in construction activities of marked lines and levels

provided for their use.

c. As construction proceeds, check every major element for line, level, and plumb.

5. Registered Land Surveyor's Log

a. Maintain a surveyor's log of control and other survey Work. Make this log available for reference.

b. Record deviations from required lines and levels, and **immediately** advise the Project Representative when deviations that exceed indicated or recognized tolerances are detected. On Project Record Drawings, record deviations that are accepted and not corrected.

c. On completion of foundation walls, major site improvements, and other Work requiring field engineering, submit this log and associated Project Drawings to the Project Representative.

6. Existing Utilities

a. Furnish information necessary to adjust, move or relocate existing structures, utility poles, lines, services or other appurtenances located in or affected by construction.

7. Site Improvements

a. Locate and layout all site improvements including, but not limited to, pavements, structures, earthwork and utility locations and grades.

8. Structure Lines and Levels

a. Locate and layout batter boards for structures, building foundations, column grids and locations, floor levels and control lines and levels required for mechanical and electrical Work.

1.3 EXECUTION

A. Cutting and Patching – Concrete and Masonry

1. The Contractor shall be responsible for any cutting, fitting, and patching that may be required to complete this project, except for core drilling required for mechanical and electrical installations, which shall be the responsibility of the Mechanical or Electrical Contractor.

2. The Contractor shall not endanger any work of any other Contractors by cutting, excavating, or otherwise altering any other work and shall not cut or alter the work of any other Contractor except with the written consent of the Architect/Engineer.

3. No cutting of structural members of the building, likely to impair its strength, shall be done without written approval from the Architect/Engineer.

4. To avoid damage to hidden utilities and structural re-enforcement any cutting or core drilling over one inch in diameter, through concrete floors and slabs will be x-rayed/scanned by the contractor prior to cutting.

    a. A qualified engineer will conduct an on-site assessment before any cutting or drilling of a pre-tensioned or post-tensioned component or other structural component of a building or structure commences. The assessment will be documented and provided to the person contracted to carry out the work.

    b. If any load bearing member is cut, cored or removed all the requirements of 29 CFR 1926 Subpart T (LARA Part 20) shall apply. This will require notifications to the DEQ 10 working days before cutting begins. Emergency notifications are possible under specific conditions.

    c. The responsible person for the project shall ensure substantial compliance with the requirements for exposure to Silica Dust. Substantial compliance will also be required for all other construction safety standards and published by the State of Michigan or Federal OSHA.

    d. Work shall be conducted outside of the regular hours to avoid disturbing the building occupants. An exception to this rule will be granted only by the project manager and shall be in writing.

    e. The MSU project representative or employee shall be responsible for locating all utilities in the area to be cut. This part of the job is mandatory and shall be given appropriate attention. Minimally the responsible person shall review all available prints and consider structural scanning. The MSU representative or employee shall take necessary steps to isolate and lock out any energy sources that may be jeopardized by the cut to protect worker safety and avoid equipment damage. In some cases, utilities will need to be cut and relocated to conduct the work. The responsible person shall take steps to notify repair persons in advance of the anticipated timing and scope of the repair project or the need for temporary services.

    f. Responsible person shall inspect the area to ensure that no damage has occurred and that the area is cleaned to an acceptable level.

5. Cutting and Patching for Mechanical Work

    a. The Mechanical Contractor shall be responsible for any core drilling required to complete their work.

    b. The Mechanical Contractor shall be responsible for the accurate location of all openings necessary for the installation of the mechanical work. Any additional openings required to move their work due to an error in the initial layout and the repair of inaccurate openings, shall be made at the expense of the Mechanical

Contractor.

6. Cutting and Patching for Electrical Work

   a. The Electrical Contractor shall be responsible for any core drilling required to complete their work.

   b. The Electrical Contractor shall be responsible for the accurate location of all openings necessary for the installation of the electrical work. Any additional openings required to move their work due to an error in the initial layout and the repair of inaccurate openings, shall be done at the expense of the Electrical Contractor.

B. Salvaging of Materials

1. Materials or equipment shown on drawing or specified herein to be removed, which are not to be reused or salvaged, shall become the property of the Contractor and will be removed from University property and disposed of legally.

2. Salvage the following items to the locations as directed:

   a. Post and chain fencing
   b. Catch basin and/or manhole frames and covers
   c. Bike racks and loops
   d. Waste cans
   e. Street and area light fixtures
   f. Face brick for repair
   g. Paver brick
   h. Limestone cap

3. Deliver all fire alarm equipment removed from the job to the IPF Storage Building 210, 1457 Recycling Drive, East Lansing, MI.

4. Deliver all Best key cylinders to be removed from the job to the Key Shop in the Infrastructure Planning and Facilities Building, 1147 Chestnut Road, East Lansing, MI.

5. Salvage of Brick and Stone

   a. Salvage brick and stone for patching areas shown on the drawings. All materials shall be carefully palletized and stored at the site. The Contractor shall take special care in handling stone to avoid chipping corners and scarring faces.

1.4 CLEANING UP

A. Cleaning up shall be in accordance with the General Conditions of the Contract.

B. No rubble, dust, or debris shall be allowed to accumulate or be transported throughout the building.

C. A thorough final cleaning of all of the adjacent streets, as specified by the Project Representative, will be required before final payment is made.

D. If the Contractor fails to clean up, the Owner may do so and the cost thereof shall be charged to the Contractor.

1.5 STARTING AND ADJUSTING

A. Refer to each Division for requirements.

1.6 CLOSEOUT PROCEDURES

A. In general, one or more walk-throughs will be performed with the Contractor and punch lists developed of items to be completed before the project can be closed out.

1.7 CLOSEOUT SUBMITTALS AND PROJECT DELIVERABLES

A. Operation and Maintenance Data

1. The Contractor shall provide operation and maintenance data as required in this specification, and submit the required information through use of the Unifier system.

2. Submittals for equipment and systems shall contain the manufacturer's information on installation, balancing, operating, maintenance, lubrication, and repair instructions and parts list for each component.

3. Please refer to MSU Document Submittal Standards at: http://ipf.msu.edu/construction/business-partners/standards-for-construction/index.html

B. As-Built Drawings

1. Submission of all As-built Drawings called for in this specification shall precede request for final payment.

2. The Contractor shall submit As-built Drawings in electronic (.pdf) format, that is not password protected, indicating any deviations from the Contract Drawings, including contract Change Orders. Upon request of the Owner, printed copies of the As-Built drawings shall be provided as well.

3. Provide any Building Information Model (BIM) data developed for this Project to the Project Representative.

C. Facility Asset Data Exchange (FADE) Log

1. The Constructor shall furnish all information as indicated on the FADE log spreadsheet. The University's FADE procedure and requirements for asset tracking and populating the log can be found at the following web addresses:

FADE process during design phase:
https://us.promapp.com/ipfmsu/Process/Minimode/Permalink/GkN4dmXiYTf9MzXAPt5ydu

FADE process during construction:
https://us.promapp.com/ipfmsu/Process/Minimode/Permalink/C3uQcSUvsfB7pLuXYgcL3P#

Should the Owner change the FADE process change in form or content, the Constructor is not relieved of fully executing the work required to compile the information and complete the Log.

D. Construction Safety Documentation

1. The Contractor shall provide written documentation of the following site safety information, as it pertains to the project only:

   a. List of all lost time accidents.
   b. Reportable incident rate (total hours worked).
   c. Details of many MIOSHA site visits, including resulting citations, violations, or actions.

E. Certificates of Inspection

1. The Contractor shall provide a copy of all Certificates of Inspection called for in this specification. Refer to Section 013000 Part 1.4.B.

F. Construction Waste Management – LEED Documentation

1. The Contractor shall provide written documentation of the Construction Waste Management program, as required for LEED Materials & Resources Credit 2. A form for this purpose is provided within this specification. Refer to Section 024200, Construction Waste Management.

G. Warranty

1. The Contractor shall provide a written guarantee stating that all work performed and material furnished is free from all defects in workmanship, and material for a period of one year, unless noted otherwise, after the equipment has been accepted by the Owner. Final payment or Certificate of Substantial Completion, whichever is issued first, shall constitute Owner acceptance.

2. Additional warranties are required for site concrete pavement (Section 321313), curb/gutter (Section 321613), bituminous pavement (Section 321216), and specific mechanical equipment (Division 23)

PART 2 - PRODUCTS
Not Used

PART 3 - EXECUTION
Not Used

END OF SECTION

SECTION 020010 - WORK ITEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Divisions 1, 2, 3, 4, 7, and 9 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 - Mobilization
WI 1.2 - Concrete Formwork
WI 1.3 - Concrete Shores and Reshores
WI 1.4 - Concrete Reinforcement
WI 1.5 - Temporary Signage

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

WI 1.2 CONCRETE FORMWORK

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to install shoring and formwork as required for cast-in-place concrete.

B. Materials

1. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on Drawings.

    a. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I
    b. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

2. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
3. Form Coatings: Provide commercial formulation form-coating compounds with a maximum VOC of 350 mg/l 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.
4. 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.

a. Provide ties that, when removed, will leave holes not larger than 1.0 in. diameter in concrete surface.

5. Shores:

a. Nail Ellis clamps, if used with wood shores, to shores with minimum of two nails to prevent slipping.
b. Wedges: Hardwood or steel. Softwood wedges prohibited.

C. Execution

1. Work shall conform to requirements of ACI 301 “Standard Specifications for Structural Concrete,” ACI 302.1 R “Guide for Concrete Floor Slab Construction,” ACI 318 “Building Code Requirements for Reinforced Concrete,” and ACI 347 “Recommended Practice for Concrete Formwork” except as modified by the following paragraphs.
2. Store all formwork and formwork materials clear of ground, protected, so as to preclude damage.
3. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.
4. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
5. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
6. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
7. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
8. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before concrete placement as required to prevent mortar leaks and maintain proper alignment.
9. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds

10. Coat contact surfaces of forms with accepted, nonresidual, low-VOC form-coating compound before reinforcement is placed.
11. Coat steel forms with non-staining, rust-preventive form oil or otherwise protect against rusting. Rust-stained steel formwork not acceptable.
12. 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.
13. For non-post-tensioned concrete, formwork shall remain in place until concrete has reached minimum two-thirds of 28-day strength. Do not place additional loads on structure until concrete has been properly reshored.
14. Clean and repair surfaces of forms to be re-used in Work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
15. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Engineer/Architect.

WI 1.3 CONCRETE SHORES AND RESHORES

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to install temporary shoring and to maintain shores in place until restoration Work requiring shores and associated concrete has properly cured.

B. Materials

1. Shores shall be steel, rated at a minimum allowable load of 4,500 lb at 12 ft extension or steel shoring towers rated at a minimum allowable load of 40,000 lbs per four leg tower (based on two 20,000 lb crossed braced frames.).

C. Execution

1. For purpose of calculations: Construction Load = 50 psf; Dead Load = 50 psf for the floor slab plus the dead load of beams and girders.
2. Shore/Reshore loads on the structure shall not exceed 40 psf distributed load on the slab or precast double tees, and concentrated loads shall not exceed posted wheel loads or 2,000 lbs., whichever is less. Concentrated bearing pressures shall not exceed 1,200 psi.
3. Shore/Reshore loads on concrete slab-on-grade shall be distributed by steel grillage or timber grillage so as not to exceed soil bearing capacity or 1,500 psf, whichever is smaller.
4. Shore/Reshore loads on asphalt slab-on-grade shall be distributed by steel grillage so as not to exceed asphalt/soil bearing capacity, with consideration of reduced asphalt bearing capacity during extreme hot weather.

5. Shore/Reshore loads shall be distributed horizontally and/or distributed to more than one level to meet shore/reshore load limitations.
6. Shore/Reshore loads shall be distributed to multiple framing members (beams/joists/double tee stems) and extend beyond the immediate work area to ensure proper distribution of loads throughout the structure.

WI 1.4 CONCRETE REINFORCEMENT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to fabricate and install all mild steel reinforcement and epoxy coated reinforcement.

B. Materials

1. Reinforcement materials shall be as specified in ACI 301 “Standard Specifications for Structural Concrete.”
2. Welded wire reinforcement: provide mats only. Roll stock prohibited.
3. Epoxy Coating Materials for Reinforcement: ASTM A775 and A884:
4. Supplier shall be certified currently under CRSI Fusion Bonded Epoxy Coating Applicator Plant Certification Program.
5. Provide one of following epoxy coatings for reinforcement and steel accessories:

    a. “Scotchkote 413,” by 3M Company, St. Paul, MN.
    b. "Nap-Gard 7-2719,” by DuPont Powder Coatings, USA, Inc.

6. Use patching material recommended by epoxy powder manufacturer, compatible with epoxy coating and inert in concrete. Acceptable materials are as follows:

    a. “Scotchkote 413/215,” by 3M Company, St. Paul, MN.
    b. “MasterEmaco P124,” by BASF Building Systems, Shakopee, MN.
    c. “Duralprep AC,” by The Euclid Chemical Company, Cleveland, OH.
    d. “Sika Armatec 110 EpoCem,” by Sika Corporation, Lyndhurst NJ.

7. Corrosion Inhibiting Coating for Existing Exposed Non-prestressed Steel Reinforcement or Welded wire reinforcement:
    a. “MasterEmaco ADH 326,” by BASF Building Systems, Shakopee, MN.
    b. “Euco 452”, or “Duralcrete Series” by The Euclid Chemical Company, Cleveland, OH.
    c. “Sikadur 32 Hi-Mod LPL," by Sika Corporation, Lyndhurst, NJ.
    d. “Sika Armatec 110 EpoCem,” by Sika Corporation, Lyndhurst NJ.

C. Execution

1. Work shall conform to requirements of ACI 301 “Standard Specifications for Structural Concrete,” ACI 315-80 “Details and Detailing of Concrete

Reinforcement," ACI 318 "Building Code Requirements for Reinforced Concrete," and Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."

2. Submittals required include: Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems and curing compounds.

3. Store concrete reinforcement materials at site to prevent damage and accumulation of dirt or excessive rust.

4. Epoxy Coated Reinforcement:

    a. Contact areas of handling and hoisting systems shall be padded or be made of nylon or other acceptable material.
    b. Use spreader bars to lift bundles of coated steel to prevent bar-to-bar abrasion.
    c. Pad bundling bands or fabricate of nylon or other acceptable material.
    d. Store coated steel on padded or wooden cribbing.
    e. Do not drag coated steel members.
    f. After placement, restrict traffic on coated steel to prevent damage.

5. Reinforcement with any of following defects will be rejected:

    a. Lengths, depths and bends exceeding CRSI fabrication tolerances.
    b. Bends or kinks not indicated on Drawings or final Shop Drawings.
    c. Reduced cross-section due to excessive rusting or other cause.

6. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as herein specified.

    a. Avoiding cutting or puncturing vapor retarder during reinforcement placement and concreting operations.
    b. Examine conditions under which concrete reinforcement is to be placed, and immediately notify Engineer/Architect in writing of unsatisfactory conditions. Do not proceed with Work until unsatisfactory conditions have been corrected in acceptable manner.
    c. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
    d. Fabricate reinforcement to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI MSP. In case of fabricating errors, do not re-bend or straighten reinforcement in manner that will injure or weaken material.
    e. Bends in reinforcement are standard 90° bends unless noted otherwise.
    f. Reinforcement with any of following defects will be rejected:

        1) Lengths, depths and bends exceeding CRSI fabrication tolerances.
        2) Bends or kinks not indicated on Drawings or final Shop Drawings.
        3) Reduced cross-section due to excessive rusting or other cause.

g. Perform all welding of mild steel reinforcement, metal inserts and connections with low hydrogen welding electrodes in accordance with AWS D1.4.
h. Epoxy coated reinforcement: Fabricator and applicator to provide installer with written instructions to handle, store and place epoxy coated reinforcement to prevent damage to coating.
i. Comply with ACI 301, Chapter 3 for placing reinforcement.
j. Use rebar chairs and accessories to hold all reinforcing positively in place. Provide rebar chairs at all formed surfaces, both vertical and horizontal, to maintain minimum specified cover. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces. Maximum spacing of chairs and accessories shall be per CRSI Manual of Standard Practice. In situations not covered by CRSI, provide support at 4 ft on center maximum each way.
k. Install welded wire reinforcement in as long lengths 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.
l. 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) Use Barsplice Products, Inc., Bar-Grip or Grip-Twist, NMB Splice Sleeve, or Erico LENTON splices.
        d) For all mechanical splices, perform splicing in strict accordance with manufacturer's requirements and instructions.
        e) All splices to develop 125% of specified yield strength of bars, or of smaller bar in transition splices.
        f) Stagger splices in adjacent bars.
        g) Except where shown on Drawings, welding of reinforcement prohibited without prior written authorization by Engineer/Architect.

    3) Compression splices: Mechanically coupled splices in accordance with ACI 318, Chapter 12.

m. Epoxy Coated Reinforcement:

    1) Rest epoxy coated steel members supported from formwork on coated wire bar supports, or on bar supports made of dielectric material or other suitable material.
    2) Coat wire bar supports with dielectric material for minimum distance of 2 in. from point of contact with coated steel member.

3) Fasten epoxy-coated steel members with nylon-, epoxy-, or plastic-coated tie wire, or other suitable material acceptable to Engineer/Architect.
4) Mechanical connections, when required, shall be installed in accordance with splice device manufacturer's recommendations. Repair any damage to coating.
5) 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.
6) Do not cut epoxy-coated steel unless permitted by Engineer/Architect. When cut, coat ends with material used for repair of coating damage.
7) All welding of epoxy-coated steel shall conform to AWS D1.4.
8) Adequate ventilation shall be provided when welding epoxy-coated steel.
9) After welding, repair coating damage as specified in Part 3 heading "Quality Control Testing During Construction," paragraph "Epoxy Coated Material."

WI 1.5 TEMPORARY SIGNAGE

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment and supervision necessary to provide and install and remove following completion of project, temporary signage as required for traffic control and user information during construction and as required by Owner/Engineer/Architect.

B. Materials

1. Temporary signage shall meet following minimum requirements:

a. Minimum size: 48” x 48”
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.

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.

WI 2.0 FLOOR SURFACE PREPARATION

WI 2.9 FLOOR REPAIR – GRIND SLAB EDGE

A. Scope of Work

1. This Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate differences between floor surface elevations larger than 1/4 ” and grind it down flush with adjacent surfaces per Detail 2.9.

B. Materials (NOT APPLICABLE)

C. Execution

1. Contractor shall locate areas identified on plan drawings.
2. Grind edge of elevated slab as indicated in detail 2.9.
3. Payment is on a L.F. basis.

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 and install new concrete and reinforcing (as required) materials to restore concrete floor slab to original condition and appearance. Refer to Detail Series 3.0 for specific requirements. Ensure all conduits and mechanical equipment are protected at all times. **Protecting exposed PT tendons per WI 20.2 is incidental to this Work.**

B. Materials

1. Concrete repair materials shall be as specified in Division 03 Section “Cast-in-Place Concrete Restoration” and “Prepackaged Repair Mortar”.
2. Conventional steel reinforcement shall be as specified in WI 1.4 and Division 03 Section “Cast-in-Place Concrete Restoration.”

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. Procedure for delaminated, spalled and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching and Overlay," Article " Preparation." Remove all unsound concrete within marked boundary prior to sawcutting and preparation of patch edges.
3. Engineer shall inspect all cavities for condition according to Section "Surface Preparation for Patching and Overlay," Article "Inspection of Repair Preparation."
4. All steel exposed within cavities shall be cleaned to bare metal by sandblasting as specified in Section "Surface Preparation for Patching and Overlay," Article "Cleaning of Reinforcement within Delamination and Spall Cavities," and damaged and defective reinforcement replaced as specified in Section "Surface Preparation for Patching and Overlay," Article "Reinforcement and Embedded Materials in Repair Areas." Exposed steel shall be epoxy coated with an approved epoxy resin as specified in Section “Cast-in-Place Concrete – Restoration.”
5. Contractor shall prepare cavities for patch placement as specified in Section "Surface Preparation for Patching and Overlay," Article "Preparation of Cavity for Patch Placement."
6. Patch materials and associated reference specifications are listed in Work Item "Concrete Floor Repair," Article " Materials," above. Patch installation procedures shall be in accordance with referenced specifications for selected material.
7. Final surface preparation, concrete placement, finishing and curing shall be performed as specified in concrete repair material specification.
8. Shoring is incidental to work.

WI 3.1 FLOOR REPAIR - PARTIAL DEPTH

A. This Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to locate and remove delaminated and unsound floor concrete, prepare cavities and install new concrete and reinforcing (as required) materials to restore concrete floor slab to original condition and appearance. Refer to Detail 3.1 for specific requirements. **Protecting exposed PT tendons per WI 20.2 is incidental to this Work.**

WI 3.2 FLOOR REPAIR – GROUT POCKET CONNECTION

A. This Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to locate and remove delaminated grout at connection pockets, prepare cavities and install new concrete and reinforcing (as required) materials to restore slab to original condition and appearance. Refer to Detail 3.1 (similar) for specific requirements.

WI 3.3 FLOOR REPAIR - FULL DEPTH

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 3.3 for specific requirement. **Protecting exposed PT tendons per WI 20.2 is incidental to this Work.**

WI 3.4 FLOOR REPAIR – CURBS/WALKS

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.

WI 3.9 PARTIAL DEPTH TEST OPENING

A. Scope of Work

1. This Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate and remove sound concrete at test areas, prepare cavities and install patching material to restore floor slab to original condition and appearance. Traffic topping is incidental to all floor patch locations. Refer to Detail Series 3.9 for specific requirements.
2. Review all openings with Engineer prior to concrete placement. P/T tendons will be reviewed and necessary P/T repairs shall be made per other Work Items.

B. Materials

1. Concrete repair materials shall be as specified in Section "Prepackaged Repair Mortar.”

C. Execution

1. Contractor shall locate and mark all Work areas as specified in Section "Surface Preparation for Patching," Article "Inspection." Contractor shall coordinate test opening locations in the field with the Engineer/Architect.
2. Procedure for delaminated, spalled and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching," Article " Preparation." Remove all unsound concrete within marked boundary prior to sawcutting and preparation of patch edges. **Do not cut P/T tendons**.
3. Engineer/Architect shall inspect all cavities for condition according to Section "Surface Preparation for Patching," Article "Inspection of Repair Preparation."
4. All steel exposed within cavities shall be cleaned to bare metal by sandblasting as specified in Section "Surface Preparation for Patching," Article "Cleaning of Reinforcement within Delamination and Spall Cavities," and damaged and defective reinforcement replaced as specified in Section "Surface Preparation for Patching," Article "Reinforcement and Embedded Materials in Repair Areas." Exposed steel shall be epoxy coated with an approved epoxy resin as specified in Work Item "Concrete Reinforcement."

5. Contractor shall prepare cavities for patch placement as specified in Section "Surface Preparation for Patching," Article "Preparation of Cavity for Patch Placement."
6. Patch materials and associated reference specifications are listed in Work Item "Concrete Floor Repair," Article " Materials," above. Patch installation procedures shall be in accordance with referenced specifications for selected material.

WI 3.10 FLOOR REPAIR – STAIR NOSING

1. This Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to locate and remove delaminated and unsound stair tread concrete, prepare cavities and install new concrete and reinforcing (as required) materials to restore concrete stairs to original condition and appearance. Refer to Detail 3.10 for specific requirements.

WI 3.11 FLOOR REPAIR SLAB ON GRADE – PARTIAL DEPTH

A. This Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to locate and remove delaminated and unsound concrete, prepare cavities and install new concrete and reinforcing (as required) materials to restore concrete floor slab to original condition and appearance. Refer to Detail 3.11 for specific requirements.
B. Properly compact subbase as required. Provide new stone subbase material, as necessary.

WI 3.12 FLOOR REPAIR SLAB ON GRADE – RE-SLOPE SLAB

A. This Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to prepare slab surfaces and install new concrete topping and reinforcing (as required) materials to reduce the steep existing slab slope at the cross over bay. Refer to Detail 3.12 for specific requirements.

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 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. Trowel applied patching material shall be as specified in Division 03 Section "Prepackaged Repair Mortar." This material may be used for shallow removal and repair Work Items only.

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.

WI 4.1 CEILING REPAIR - PARTIAL DEPTH

A. Refer to Work Item 4.0, "Concrete Ceiling Repair" for Scope of Work, materials and procedure associated with this Work Item. Refer to Detail 4.1 for specific requirements.

WI 4.5 STAIR CEILING REPAIR - PARTIAL DEPTH

A. Refer to Work Item 4.0, "Concrete Ceiling Repair" for Scope of Work, materials and procedure associated with this Work Item. Refer to Detail 4.1 for specific requirements.

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 and install new concrete and reinforcing (as required) materials to restore concrete beams and joists to original condition and appearance. Refer to Detail Series 5.0 for specific requirements.

B. Materials
1. Cast-in-place concrete repair materials shall be as specified in Division 03 Section “Cast-in-Place Concrete Restoration”, Division 03 Section “Prepackaged Repair Mortar."
2. Conventional steel reinforcement shall be as specified in Division 03 Section “Cast-in-Place Concrete”, Division 03 Section “Cast-in-Place Concrete Restoration” and/or Work Item 1.4, “Concrete Reinforcement.”

3. Trowel applied patching material shall be as specified in Division 03 Section "Prepackaged Repair Mortar." This material may be used for shallow removal and repair Work Items only.

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.

WI 5.1 BEAM REPAIR - PARTIAL DEPTH

A. Refer to Work Item 5.0, "Concrete Beam and Joist Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 5.1 for specific requirements.

WI 6.0 CONCRETE COLUMN 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 concrete, prepare cavities, and install new concrete and reinforcing (as required) materials to restore concrete beams to original condition and appearance. Refer to Detail Series 6.0 for specific requirements. Ensure all conduits, mechanical equipment, signs, and sprinkler lines/head are protected at all times.

B. Materials

1. Cast-in-place concrete repair materials shall be as specified in Division 03 Section “Cast-in-Place Concrete Restoration.”
2. All repairs shall be form and pumped. Patching material shall be as specified in Division 03 Section "Prepackaged 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.”

Install shoring at repair locations where required per the Construction Documents prior to starting removals.

2. Contractor shall identify all critical repair work areas prior to start of work. Engineer shall verify critical repair area identification.
3. Procedure for delaminated, spalled and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching and Overlay," Article "Preparation."
4. Engineer shall inspect all cavities for condition according to Section "Surface Preparation for Patching and Overlay," Article "Inspection of Repair Preparation."
5. All steel exposed within cavities shall be cleaned to bare metal by sandblasting according to Section "Surface Preparation for Patching and Overlay," Article "Cleaning of Reinforcement within Delamination and Spall Cavities," and damaged and defective reinforcement replaced as specified in Section "Surface Preparation for Patching and Overlay," Article "Reinforcement and Embedded Materials in Repair Areas." Exposed steel shall be epoxy coated with an approved epoxy resin as specified in Section “Cast-in-Place Concrete - Restoration."
6. Contractor shall prepare cavities for patch placement as specified in Section "Surface Preparation for Patching and Overlay," Article "Preparation of Cavity for Patch Placement."
7. Shoring support shall be provided as necessary and in accordance with Section “Cast-in-Place Concrete – Restoration.”
8. 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.
9. Shoring is incidental to work.

WI 6.1 COLUMN REPAIR – PARTIAL DEPTH

A. Refer to Work Item 6.0, "Concrete Column Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 6.1 for specific requirements.

WI 7.0 CONCRETE WALL 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 concrete, prepare cavities and install new concrete and reinforcing (as required) materials to restore concrete beams to original condition and appearance. Refer to Detail Series 7.0 for specific requirements. Ensure all conduits, signs, mechanical equipment and sprinkler lines/head are protected at all times.

B. Materials

1. Cast-in-place concrete repair materials shall be as specified in Division 03 Section “Cast-in-Place Concrete Restoration.”
2. All repairs shall be form and pumped. Patching material shall be as specified in Division 03 Section "Prepackaged 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.” Install shoring at repair locations where required per the Construction Documents prior to starting removals.
2. Contractor shall identify all critical repair work areas prior to start of work. Engineer shall verify critical repair area identification.
3. Procedure for delaminated, spalled and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching and Overlay," Article "Preparation."
4. Engineer shall inspect all cavities for condition according to Section "Surface Preparation for Patching and Overlay," Article "Inspection of Repair Preparation."
5. All steel exposed within cavities shall be cleaned to bare metal by sandblasting according to Section "Surface Preparation for Patching and Overlay," Article "Cleaning of Reinforcement within Delamination and Spall Cavities," and damaged and defective reinforcement replaced as specified in Section "Surface Preparation for Patching and Overlay," Article "Reinforcement and Embedded Materials in Repair Areas." Exposed steel shall be epoxy coated with an approved epoxy resin as specified in Section “Cast-in-Place Concrete - Restoration."
6. Contractor shall prepare cavities for patch placement as specified in Section "Surface Preparation for Patching and Overlay," Article "Preparation of Cavity for Patch Placement."
7. Shoring support shall be provided as necessary and in accordance with Section “Cast-in-Place Concrete – Restoration.”
8. 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.
9. Shoring is incidental to work.

WI 7.1 WALL REPAIR - PARTIAL DEPTH

A. Refer to Work Item 7.0, "Concrete Wall Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 7.1 for specific requirements.

B. Access to perform repair is incidental to project.

WI 8.0 PRECAST TEE BEAM REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals including shoring necessary to locate precast tee beam elements to be repaired, shore surrounding construction supported by tee beam element being repaired, remove delaminated and unsound concrete and sound concrete, prepare cavities and install concrete and reinforcing (as required) to rebuild precast tee beam 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", Division 03 Section "Cast-in-Place Concrete Restoration", Division 03 Section "Prepackaged Repair Mortar", and/or Division 03 Section "Latex Modified Concrete and Mortar."
3. Conventional steel reinforcement shall be as specified in Division 03 Section "Cast-in-Place Concrete", Division 03 Section "Cast-in-Place Concrete Restoration" and/or Work Item 1.4, "Concrete Reinforcement."
4. Trowel applied patching material shall be as specified in Division 03 Section "Prepackaged Repair Mortar." This material may be used for shallow removal and repair Work Items only.
5. Chipping hammers shall be 15 lb or less unless directed by Engineer/Architect.

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 8.4 TEE FLANGE REPAIR - FULL DEPTH

A. Refer to Work Item 8.0, "Precast Tee Beam Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 8.4 for specific requirements.

WI 10.0 EXPANSION JONT 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.

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 Restoration”, Division 03 Section “Prepackaged Repair Mortar”.
3. Trowel applied patching material shall be as specified in Division 03 Section Prepackaged Repair Mortar." This material may be used for shallow removal and repair Work Items only.

C. Execution

1. Contractor shall remove existing expansion materials in manner that minimizes damage to adjacent concrete.
2. Joint installation procedures shall be in accordance with referenced specifications and manufacturer's recommendations.

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.

WI 10.3.1 EXPANSION JOINT – ELASTOMERIC NOSING REPAIR

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 10.3A for specific requirements.

WI 10.7 RE-ANCHOR TRAFFIC PLATE

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate loose or bent expansion joint traffic plates, and install new anchors to keep plates pinned to the floor.

B. Materials

1. Contractor to provide new corrosion resistant anchors with rounded or countersunk heads.

C. Execution

1. Identify traffic plates where shown on plan drawings. Where plates are loose or elevated, drill new holes in the plates and slabs, and install new anchors to secure plate to the floor.

WI 10.8 SHEAR TRANSFER ANGLES – REPLACE PADS

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove and reinstall shear transfer connection angles where bearing pads are loose or missing, as indicated on the Drawings. Refer to Detail 10.8 for specific requirements.

B. Materials

1. Anchoring system shall be as shown on the referenced detail.
2. Slide Bearing Pads: Ultrahigh molecular weight, high-density polyethylene resin. Acceptable material is "Korolath PE" by Koro Corporation, Hudson, MA.

C. Execution

1. Contractor shall locate and layout Work areas and verify location with Engineer/Architect.

2. Contractor shall remove existing steel angels, install new korolath pads as detailed, and reinstall steel angles in their original orientation. Provide additional shims as needed for fitment, incidental.

WI 11.0 CRACK AND JOINT REPAIR

WI 11.1 ROUT AND SEAL 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.

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. Crack and joint sealant work shall be incidental to traffic topping system.

WI 11.2 JOINT 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 joints and cracks. Refer to Detail 11.2 for specific requirements.

B. Materials

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

C. Execution

1. Contractor shall locate failed crack/joint sealant by visual inspection.
2. Contractor shall remove existing sealant from joints and/or cracks.
3. When existing joint dimensions do not conform to Detail 11.2, joints shall be routed or sawcut to an adequate width and depth to match Work Item Detail. 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. Sealant materials and installation procedures shall be in accordance with referenced specifications for selected material.
6. Traffic topping manufacturer shall verify in writing that joint sealant is compatible with traffic topping.
7. Crack and joint sealant work shall be incidental to traffic topping system.

WI 11.3A WALL PANEL JOINT SEALANT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate and mark failed vertical joint sealant, remove existing sealant, prepare edges and reseal vertical joints. Refer to Detail 11.3A for specific requirements.

B. Materials

1. Replacement material shall be silicone.

2. Approved materials for use in this Work are specified in Division 07 Section "Concrete Joint Sealants."
3. Materials used shall be as specified in Division 07 Section "Architectural Joint Sealants."

C. Execution

1. Contractor shall locate failed crack/joint sealant by visual inspection.
2. Contractor shall remove existing sealant from joints and/or cracks.
3. 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.

4. Sealant materials and installation procedures shall be in accordance with referenced specifications for selected material.

WI 11.3B COLUMN TO WALL JOINT SEALANT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate and mark failed vertical joint sealant, remove existing sealant, prepare edges and reseal vertical joints. Refer to Detail 11.3B for specific requirements.

B. Materials

1. Replacement material shall be silicone.

2. Approved materials for use in this Work are specified in Division 07 Section "Concrete Joint Sealants."
3. Materials used shall be as specified in Division 07 Section "Architectural Joint Sealants."

C. Execution

1. Contractor shall locate failed crack/joint sealant by visual inspection.
2. Contractor shall remove existing sealant from joints and/or cracks.
3. 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.
4. Sealant materials and installation procedures shall be in accordance with referenced specifications for selected material.

WI 11.4 TOOL AND SEAL CONTROL JOINTS (INCIDENTAL)

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.

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 joints at all column grid lines and at all existing control and construction joints, and at any additional locations shown in the Construction Documents.
2. Control joints shall be tooled and formed in plastic concrete. Sawcutting joints after concrete sets will not be 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 EPOXY INJECTION

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate cracks, prepare and pressure inject cracks with an epoxy resin so as to create waterproof barrier and/or structural repair as indicated in the Drawings. Refer to Detail 11.5 for specific requirements.

B. Materials

1. Epoxy injection materials shall be as specified in Division 03 Section “Epoxy Injection Systems.”

C. Execution

1. Epoxy injection work and materials shall be performed in accordance with Division 03 Section "Epoxy Injection Systems."
2. Contractor is responsible for location of all locations requiring epoxy injection prior to start of Work.
3. Contractor shall allow for Engineer/Architect inspection of all epoxy injection sites for condition as specified.
4. No payment will be allowed for Work executed without Engineer/Architect inspection and verification.
5. Remove and patch all ports, holes, temporary seal materials to match existing conditions. This is considered incidental to the Work.
6. Clean and paint the repair area limited to the disturbed surfaces to match existing surfaces.

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.

B. Materials

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

C. Execution

1. Intersection to be sealed shall be thoroughly cleaned by sandblasting to remove all contaminants and foreign material.
2. Entire Work area shall then be cleaned with compressed air to assure that all loose particles have been removed and that intersection is dry.
3. 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.
4. After primer has cured, apply cove sealant to intersection such that sealant extends 0.75 in. onto each of intersecting faces.
5. 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.
6. Remove excess sealant and allow to cure.

WI 11.7A COVE SEALANT REPLACEMENT - WIDE

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to prepare concrete surfaces and install new wide urethane cove sealant between floor and vertical surfaces as shown on Drawings. Refer to Detail 11.7A for specific requirements.

B. Materials

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

C. Execution

1. Intersection to be sealed shall be thoroughly cleaned by sandblasting to remove all contaminants and foreign material.
2. Entire Work area shall then be cleaned with compressed air to assure that all loose particles have been removed and that intersection is dry.
3. 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.
4. After primer has cured, apply cove sealant at intersecting faces as shown on the drawings.

5. Work cove sealant into joint so that all air is removed and tool to concave shape such that MAXIMUM throat dimension of no more than 0.5 in. is maintained. Refer to manufacturer recommendations for sealant sizing recommendations.
6. Remove excess sealant and allow to cure.

WI 11.7B RAIL PLATE SEALANT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to prepare concrete and steel surfaces and install new silicone cove sealant at railing mounting plate perimeters were shown on Drawings. Refer to Detail 11.7B for specific requirements.

B. Materials

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

C. Execution

1. Contractor shall remove existing sealant materials and prepare existing concrete and steel surfaces.
2. 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.
3. After primer has cured, apply cove sealant to intersection such that sealant extends 0.50 in. onto each of intersecting faces.
4. Work cove sealant into joint so that all air is removed and tool to concave shape such that the throat dimension is no more than 0.5 in. Verify requirements with manufacturers material recommendations.
5. Remove excess sealant and allow to cure.

WI 16.0 TRAFFIC TOPPING

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals, including installation of joint sealant materials, 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 required 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.

WI 16.1 TRAFFIC TOPPING – VEHICULAR – FULL SYSTEM

A. Scope of Work

1. Full system coating work is intended to be incidental to concrete repairs within existing areas of traffic topping.

2. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to prepare surface of concrete patches and/or previously traffic topped areas and install traffic topping on prepared concrete and existing traffic topping. Refer to Detail 16.1 for specific requirements.

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. Preparation of new concrete patches shall be in strict accordance with manufacturer's recommendations and referenced specifications.
3. 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 16.5 TRAFFIC TOPPING – RECOAT (COMPLETE SYSTEM)

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals, including preparation and installation of crack, joint and cove sealant materials, necessary to prepare and recoat the existing traffic topping as shown on Drawings. Refer to Detail 16.1 for specific requirements.

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. Removal of loose/failed existing coating, preparation of exposed concrete surfaces and existing traffic topping membrane 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. Shotblast surface preparation is required for floors.
3. Coating system shall be installed by licensed applicators in strict accordance with manufacturer's recommendations and referenced specification section.
4. Crack preparation, including installation of sealant material where required, is incidental to traffic topping work.
5. Preparation and installation of crack, joint, and cove sealant material, where required, is incidental to this Work Item.
6. 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. After this has been completed, the entire area will be recoated.
7. Existing prepared traffic topping membrane shall be recoated with a complete system of the selected specified traffic topping system (Waterproofing coat(s), intermediate coat(s) with aggregate and top coat.
8. Coating system shall be thoroughly cured and traffic marking completed prior to returning work areas to service.

WI 20.0 P/T SYSTEM REPAIR (BUTTONHEAD)

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 “buttonhead” post-tensioning system. Refer to Detail series 20.0 for specific requirements. Refer to Section “Unbonded Post-Tensioned Concrete” for further requirements.
2. The furnishing and installing of reinforcing steel as shown on the Details is incidental to this work. Concrete removals and replacement is not included in this

work and shall be performed and paid for under Work Item series WI 3.0 or WI 4.0 as applicable.

B. Materials

1. Post-Tensioning materials and related materials shall be as specified in Section “Unbonded Post-Tensioned Concrete”.
2. “Buttonhead” Post-tensioning materials:

    a. Couplings, anchor plates and stressing shims shall conform to ACI 301 and shall meet or exceed ultimate strength requirements of original tendon.
    b. Tendon wire shall conform to ASTM A421 type BA.
    c. Bars shall conform to ASTM A722 and shall meet or exceed ultimate strength requirements of original tendon.

3. Reinforcing steel shall be epoxy coated as specified in Work Item 1.4, “Concrete Reinforcement’.
4. Epoxy adhesive for reinforcing dowels shall be Hilti RE-500 or approved equivalent.

C. Prequalified Installers:

1. Refer to Section “Unbonded Post-Tensioned Concrete”.

D. Prequalified Suppliers:

1. Refer to section “Unbonded Post-Tensioned Concrete”.

E. 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 are incidental and will not be paid for separately.
2. Refer to Work Item series 20.0 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 below).

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 **nonstressed** 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 detension 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 Section "Unbonded Post-Tensioned Concrete". 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 Section “Unbonded Post-Tensioned Concrete” for additional requirements.

WI 20.2 PROTECT EXPOSED P/T TENDON(S) (INCIDENTAL)

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove damaged tendon paper wrap, re-grease (or epoxy coat tendons as approved by Engineer) in damaged area and re-wrap tendon. Concrete work performed in association with this work will be paid separately under Work Item Series 3.0. Refer to Detail 20.2 for specific requirements.

B. Materials

1. Refer to Section “Unbonded Post-Tensioned Concrete”.

C. Execution

1. Remove damaged paper wrap 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. Wrap tape over exposed tendon. Tape shall overlap existing paper wrap by at least two inches at each end.
5. Tape entire length of repair, spirally wrapping tape around tendon to provide at least two layers of tape. Taping shall overlap existing paper wrap by 2 in. at each end.

1. Concrete” for additional requirements.

WI 20.6 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 20.6 for specific requirements.

B. Materials

1. Refer to WI 20.0 “P/T System Repair – Buttonhead”, Article “Materials” and Section “Unbonded Post-Tensioned Concrete”.

C. Execution

1. Detension 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 20.6 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 WI 20.2 and is incidental to this work.
5. Refer to WI 20.0 and Section “Unbonded Post-Tensioned Concrete” for additional requirements.

WI 20.8 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 20.8 for specific requirements. This work is performed in conjunction with either Work Item 20.3, 20.5 or 20.6.

B. Materials

1. Refer to Work Item 0.0 “P/T System Repair (Buttonhead)”, Article “Materials” and Division 03 Section “Unbonded Post-Tensioned Concrete.”

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 20.9.
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 20.2 and is incidental to this work.

4. Refer to Work Item 20.0 and Division 03 Section “Unbonded Post-Tensioned Concrete” for additional requirements.

WI 20.9 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 tendon.

B. Materials

1. Refer to WI 20.0 “P/T System Repair – Buttonhead”, Article “Materials” and Section “Unbonded Post-Tensioned Concrete”.

C. Execution

1. Install new tendon within concrete removal areas 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 WI 20.0 and Section “Unbonded Post-Tensioned Concrete” for additional requirements.

WI 25.0 MECHANICAL - DRAINAGE

WI 25.9 MECHANICAL – INSTALL UTILITY COVER PLATES

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to install new cover plates at existing utility access locations in floor slabs. Refer to Detail 25.9 for specific requirements.

WI 43.0 MISCELLANEOUS METALS

WI 43.3 RAILING REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to repair bent or damaged railings to match their original orientation, where indicated on the plan drawings. Refer to Detail 43.3 for specific requirements.

WI 43.4 REPLACE RAILING ANCHORS

A. Scope of Work
   1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to repair bent or damaged railings to match their original orientation, where indicated on the plan drawings. Refer to Detail 43.4 for specific requirements.

WI 43.5 GATE REPAIR

A. Scope of Work

   1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove and replace existing snow gate mounting hardware with new heavy duty mounts, allowing proper operation of the gates. Refer to Detail 43.5 for specific requirements.

WI 45.0 PAINTING

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 required pavement markings.

B. Materials

   1. Painting materials shall be as specified in Division 09 Section "Pavement Marking."

C. Execution

   1. Unless otherwise indicated in the Construction Documents, stripes and paint color shall match all existing marks and be provided at same locations.
   2. Where new striping layout is described in the Construction Documents that conflicts with existing striping layout, remove existing stripes in those locations where they conflict with new striping layout. See referenced specification section for removal requirements.

3. Where existing traffic marking layout is to be maintained, Contractor shall prepare drawing of existing traffic marking layout in work areas prior to starting with repairs. Contractor shall note stall width, angle of parking, directional traffic arrows and all other existing pavement markings.
4. Contractor shall submit striping plan for Engineer/Architect's review.
5. Engineer/Architect may inspect all layout and surface preparation for conditions in accordance with Division 09 Section "Pavement Marking."

WI 45.2A PAINT ROOF COLUMN CAUTION STRIPE

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate, layout and paint existing concrete surfaces. Refer to Detail 45.2A for specific requirements.

B. Materials

1. Paint materials shall be as specified in Division 09 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 Division 09 Section "Exterior Painting" and manufacturer's recommendations.
3. Contractor shall remove all debris from Work area prior to application of primer or paint.
4. Contractor shall apply primer and Paints according to Division 09 Section "Exterior Painting" and in strict accordance with manufacturer's recommendations.

WI 45.4 PAINT DOORS AND FRAMES

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to contain, with full height barriers, preparation debris and paint during operations and prepare, prime and paint steel doors and frames as located on Drawings.

B. Materials

1. Paint materials shall be as specified in Division 09 Section “Exterior Painting.”

C. Execution

1. Contractor shall locate and verify with Engineer/Architect all Work areas.
2. Contractor shall verify color selection with Owner prior to start of Work.

3. Contractor shall take all necessary measures to contain, with full height barriers, sandblasting debris and paint to immediate Work area to protect public from injury and property from damage.
4. Contractor shall solvent clean any surface area with oil or grease build-up prior to receiving additional preparation in accordance with SSPC-SP1 and Division 09 Section "Exterior Painting."
5. Contractor shall prepare all surfaces with surface corrosion in accordance with SSPC-SP10 “Near White Metal Blast Cleaning” or SSPC-SP11 “Power Tool Cleaning to Bare Metal” and Division 09 Section "Exterior Painting."
6. Contractor shall remove all debris from Work area prior to application of primer or paint.
7. Contractor shall apply primer to all prepared metal surfaces on same day (within 8 hrs) as preparation operations. Apply primer and Paints according to Division 09 Section "Exterior Painting" and in strict accordance with manufacturer's recommendations.

WI 45.5 PAINT EXPOSED FIRE SUPPRESSION SYSTEM

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to contain, with full height barriers, preparation debris and paint during operations and prepare, prime and paint existing fire suppression system piping through the entire facility, as located on Drawings.

B. Materials

1. Paint materials shall be as specified in Division 09 Section “Exterior Painting.”

C. Execution

1. Contractor shall locate and verify with Engineer/Architect all Work areas.
2. Contractor shall verify color selection with Owner prior to start of Work.
3. Contractor shall take all necessary measures to contain, with full height barriers, sandblasting debris and paint to immediate Work area to protect public from injury and property from damage.
4. Contractor shall solvent clean any surface area with oil or grease build-up prior to receiving additional preparation in accordance with SSPC-SP1 and Division 09 Section "Exterior Painting."
5. Contractor shall prepare all surfaces with surface corrosion in accordance with SSPC-SP10 “Near White Metal Blast Cleaning” or SSPC-SP11 “Power Tool Cleaning to Bare Metal” and Division 09 Section "Exterior Painting."
6. Contractor shall remove all debris from Work area prior to application of primer or paint.
7. Contractor shall apply primer to all prepared metal surfaces on same day (within 8 hrs) as preparation operations. Apply primer and Paints according to Division 09

Section "Exterior Painting" and in strict accordance with manufacturer's recommendations.

WI 45.8 PAINT RAILING

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to contain, with full height barriers, preparation debris and paint during operations and prepare, prime and paint existing steel railings as located on Drawings.

B. Materials

1. Paint materials shall be as specified in Division 09 Section “Exterior Painting.”

C. Execution

1. Contractor shall locate and verify with Engineer/Architect all Work areas.
2. Contractor shall verify color selection with Owner prior to start of Work.
3. Contractor shall take all necessary measures to contain, with full height barriers, sandblasting debris and paint to immediate Work area to protect public from injury and property from damage.
4. Contractor shall solvent clean any surface area with oil or grease build-up prior to receiving additional preparation in accordance with SSPC-SP1 and Division 09 Section "Exterior Painting."
5. Contractor shall prepare all surfaces with surface corrosion in accordance with SSPC-SP10 “Near White Metal Blast Cleaning” or SSPC-SP11 “Power Tool Cleaning to Bare Metal” and Division 09 Section "Exterior Painting."
6. Contractor shall remove all debris from Work area prior to application of primer or paint.
7. Contractor shall apply primer to all prepared metal surfaces on same day (within 8 hrs) as preparation operations. Apply primer and Paints according to Division 09 Section "Exterior Painting" and in strict accordance with manufacturer's recommendations.

WI 73.0 FLASHING AND WEEPS

WI 73.1 METAL FLASHING REPAIR

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove and replace existing missing or damaged flashing materials to match the original installation. Refer to Detail 73.1 for additional information.

B. Materials

1. Metal flashing shall be as specified in Division 07 Section “Sheet Metal Flashing and Trim” or Division 04 Section “Unit Masonry.”
2. Sealants under flashing shall be as specified in Division 07 Section “Architectural Joint Sealants.”
3. Paint shall be as specified in Division 04 Section “Unit Masonry.”

C. Execution

1. Contractor shall remove materials as required to access locations of flashing replacement.
2. Provide and Install new flashing, to match the original installation design.
3. End dams shall be provided to prevent water from running off the flashing ends.
4. Flashing shall be continuous, and joints and laps in individual flashing sections shall be fabricated so they are water tight.

WI 73.4 INSTALL NEW WEEP HOLES

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to install supplemental weep holes in wall assembly. See Detail 73.4 for specific requirements.

B. Materials

1. New weep materials shall be as shown in Division 04 Section “Unit Masonry” or as shown on Detail referenced in “Scope of Work.”

C. Execution

1. Contractor shall install new weep holes at the base of the masonry assembly, immediately above shelf angle/lintel or other supporting element.
2. New weeps shall be installed in mortar joints, unless noted otherwise.
3. Do not damage existing wall assembly, including flashing, during new weep installation.

WI 76.0 CRACK REPAIR AND TUCKPOINTING

WI 76.3 TUCKPOINTING

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to tuckpoint defective, cracked, broken or eroded joints in existing brick work. Refer to detail 76.3 for specific requirements.

B. Materials

1. Materials shall be as specified in Division 04 Section "Unit Masonry."
2. Portland Cement: ASTM C 150, Type I or II.
3. Quicklime: ASTM C5; pulverized lime.
4. Hydrated Lime: ASTM C 207, Type N.
5. Aggregate for Mortar: ASTM C 144; except for joints less than 0.25 in., use aggregate graded with 100% passing the No. 16 sieve.
6. Water: Potable
7. Mortar shall match existing color.

C. Execution

1. Contractor shall locate and mark all Work areas. Engineer/Architect shall verify locations prior to start of Work.
2. All defective joints which are cracked, broken, or eroded to depth of 0.5 in. or more shall be tuckpointed.
3. Joints to be tuckpointed shall be cut back to depth of 0.75 in., or to full depth of deterioration. Use mechanically operated blades only to perform cutting. Joint at back of cut shall have square shoulder. Remove all mortar from upper and lower surfaces and sides of mortar joint being prepared.
4. Contractor shall flush all mortar joints thoroughly with clean water under pressure prior to tuckpointing to remove all dust, dirt, and laitance. Brick shall be damp and free of excess water before tuckpointing commences. Take all necessary precautions to prevent water from entering cavity space during cleaning operations.
5. Tuckpointing shall be performed using Type N mortar in accordance with ASTM C270 using specified materials.
6. Match existing mortar color. Mortar shall be dry and mixed thoroughly prior to adding water. Add one-half required mixing water and allow to stand 1 hour, then add balance of mixing water.
7. Press mortar into prepared joint using pointing tool 0.125 in. smaller than width of joint until joint is packed full. Finish point joint with pointing tool at least 0.125 in. wider than prepared joint.
8. Prior to initial set of mortar, tool joints to match existing.
9. Allow 3 to 7 days for mortar to harden prior to cleaning of brick wall.
10. Dispose of all accumulated material and leave premises in clean condition.
11. Masonry surfaces that become dirty or smeared during joint cutting and repointing of joint surfaces shall be cleaned with bristle brushes and plain water.
12. Unnecessary damage to surrounding brick shall be repaired by Contractor at no cost to Owner.

WI 80.0 BRICK/CONCRETE MASONRY UNIT FAÇADE

WI 80.1 REMOVE AND REPLACE FACE BRICK

B. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary for local brick removal and replacement due to fractures, cracks, broken or unsound brick. Refer to Detail 80.1 for specific requirements.

B. Materials

1. Materials shall be as specified in Division 04 Section "Unit Masonry."

C. Execution

1. Contractor shall locate and mark all brick to be replaced. Engineer/Architect shall verify replacement locations prior to start of Work.
2. Contractor shall remove all existing fractured, cracked, spalled, broken or structurally unsound brick and all brick damaged during removal and toothing work.
3. Internal structural steel exposed during removal process shall be cleaned to bare metal per SSPC-SP-11, and coated with high performance coating. Coat with one coat of corrosion resistant paint prior to brick replacement.
4. Entire cavity of removed brick shall be thoroughly cleaned of all mortar from top, bottom, and both sides of all brick surrounding new brick work. Do not allow mortar droppings to accumulate in cavity space, in weep holes, or on flashing. Engineer/Architect shall inspect all cavities for condition prior to commencement of new construction.
5. New brick veneer shall be anchored to backing with flexible metal ties embedded in masonry joints and attached to existing structure. Space veneer anchors at 16 in. o.c. vertically. Horizontal anchor spacing shall not exceed 24 in. o.c. Existing veneer anchors not damaged during brick removal may be reused at Contractor's option. Clean existing anchors prior to replacing brick veneer.
6. Flush cavity thoroughly with water to remove all dust and laitance prior to brick replacement. Take all necessary precautions to prevent water from entering cavity space during cleaning operations. Allow excess water to run off. New brick or existing brick removed from building shall be laid in full bed of mortar while wall is still damp. All brick repair work shall be flush with existing.
7. New brick work is to be toothed into existing brick work.
8. All bed and head joints shall be fully filled with mortar. Collar joints shall remain clear of mortar in single wythe veneer construction. For multi-wythe brick construction, fill collar joints.
9. Prior to initial set of mortar, tool joints to match existing.
10. Adequate weather protection shall be installed over all areas left open at completion of each day's work.
11. Allow 3 to 7 days for mortar to harden prior to cleaning of brick wall.
12. Dispose of all accumulated material and leave premises in clean condition.

13. Masonry surfaces that become dirty or smeared during joint cutting and repointing of joint surfaces shall be cleaned with bristle brushes and plain water.
14. Unnecessary damage to surrounding brick shall be repaired by Contractor at no cost to Owner.

WI 80.3 REMOVE AND REPLACE CONCRETE MASONRY UNIT

A. Refer to Work Item 80.1, "Remove and Replace Face Brick" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 80.3 for specific requirements. Note specific requirements for CMU reinforcing called out on Detail.

WI 95.0 DOORS AND WINDOWS

WI 95.2 WINDOW GLAZING CAP SEAL

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to prepare existing window glass and window frame substrates and install sealant to perimeter of existing window lites. See Detail 95.2 for specific requirements.

B. Materials

1. Sealants shall be as specified in Division 07 Section "Architectural Joint Sealants."

C. Execution

1. Contractor shall locate and mark all locations requiring “wet sealing” sealing installation as detailed on Drawings.
2. Contractor shall remove existing joint sealant (if present). Care shall be taken not to damage glass adjacent façade, window components or other surrounding features.
3. If gasket or glazing tape extends beyond the frame, cut back gasket/glazing tape flush with frame. Take care not to damage glass when cutting gasket/tape.
4. Joint shall be thoroughly cleaned to bare substrate materials by grinding to remove all debris, residual joint filler material and joint sealant material. Joint shall be airblasted to remove remaining debris after preparation.
5. Unnecessary damage to surrounding elements shall be repaired by Contractor at no cost to Owner.
6. Contractor shall install liquid applied joint sealant in accordance with Details and manufacturer's recommendations.
7. Sealed joints shall be neat in appearance. Poorly sealed or improperly sealed joints shall be removed and replaced at no additional cost to Owner.

END OF SECTION 02 00 10

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 20º 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

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.

B. This Section includes the provision of all labor, materials, equipment, supervision and incidentals necessary to prepare existing sound concrete slab surfaces to receive bonded concrete overlay.

C. Related Sections: Following Sections contain requirements that relate to this Section:

1. Division 03 Section “Cast-in-Place Concrete – Restoration”
2. Division 03 Section “Prepackaged Repair Mortar.”

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-14)

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 and ELECTRICAL CONDUIT in repair area and mark these locations for reference during concrete removal. Do **NOT** nick or cut any embeds unless approved by Engineer/Architect.

H. For overlay installation, boundaries of overlay areas will be as defined in project drawings and verified by Engineer/Architect.

3.2 PREPARATION

A. **Temporary shoring may be required at concrete floor repair areas exceeding 5 sq ft 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 proved uniform cavity surface. If delaminations exist beyond minimum removal depth, chipping shall continue until all unsound and delaminated concrete has been removed from cavity.

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) and electrical conduit and any other embedded items near surface of concrete. Any damage to existing reinforcement 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 overlay shall be heavy abrasive blasted or heavy shotblasted prior to overlay placement, to produce a final concrete surface profile matching ICRI CSP.

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 insure 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 shall be sandblasted. Airblasting is required as final step to remove sand. All debris shall be removed from site prior to commencement of patching.

C. All patches shall be prepared to ICRI CSP as required by product manufacturer but not less than ICRI CSP 5.

END OF SECTION 025140

SECTION 033021 - CAST-IN-PLACE CONCRETE RESTORATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies cast-in-place concrete, including reinforcement, concrete materials, mix design, placement procedures, and finishes.

B. Work in other Sections related to Cast-in-Place Concrete:
   1. Division 7 Section “Traffic Coatings.”
   2. Division 7 Section “Expansion Joint Assemblies.”
   3. Division 7 Section “Concrete Joint Sealants.”
   4. Division 9 Section “Pavement Marking.”

1.3 SUBMITTALS

A. General: In addition to the following, comply with submittal requirements in ACI 301.

B. Product Data: For each type of manufactured material and product indicated.

C. Design Mixes: For each concrete mix.

1.4 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 Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

C. Source Limitations: Obtain each type of cement of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

D. Comply with ACI 301, "Specification for Structural Concrete," including the following, unless modified by the requirements of the Contract Documents.
   1. General requirements, including submittals, quality assurance, acceptance of structure, and protection of in-place concrete.
   2. Formwork and form accessories.
   3. Steel reinforcement and supports.
   4. Concrete mixtures.
   5. Handling, placing, and constructing concrete.

PART 2 - PRODUCTS

2.1 FORMWORK

A. Furnish formwork and form accessories according to ACI 301.

2.2 STEEL REINFORCEMENT

A. Epoxy-coated Reinforcing Bars: ASTM A775

B. Epoxy-Coated Welded Wire Fabric: ASTM A884, fabricated from as-drawn steel wire into flat sheets, mats only. Roll stock prohibited.

C. Provide bar supports according to CRSI's "Manual of Standard Practice." Use all-plast bar supports when in contact with exposed concrete surface.

2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Types I or II or Type I/II.

B. Fly Ash: ASTM C618, Class F.

C. Ground-Granulated Blast Furnace Slag: ASTM C989, Gr. 100 or higher.

D. Silica Fume: ASTM C1240.

E. Normal-Weight Aggregate: ASTM C 33, uniformly graded, not exceeding ¾ inch nominal size.

F. Water: Potable and complying with ASTM C 1602.

2.4 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain no more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures. Do not use admixtures containing calcium chloride.

B. General: Admixtures certified by manufacturer that all admixtures used are mutually compatible.

C. Admixtures: Use admixtures according to manufacturer's written instructions.
   1. Use water-reducing or high-range water reducing admixture in concrete, as required, for placement and workability.
   2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
   3. Use high-range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, fiber reinforced concrete, and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
   4. Use non-corrosive accelerator for all concrete, less than 8 inches thick, placed at air temperatures below 50 degrees Fahrenheit.
   5. Use high range water reducing admixture and viscosity modifying admixture, where required, in Self-Consolidating Concrete (SCC).
   6. Use corrosion-inhibiting admixture in parking structure slabs and other areas so noted on the drawings. The dosage shall be 3 gallons per cubic yard.
   7. Use alkali-silica reactivity inhibitor unless ready mix company confirms that the aggregates to be used on the job are non-reactive.

D. Normal Water-Reducing Admixture: ASTM C 494, Type A.

E. Mid Range Water-Reducing Admixture: ASTM C 494, Type A.

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

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

H. 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,” W.R. Grace & Co.

I. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

J. Air Entraining Admixture: ASTM C260.

K. Non-Chloride, Non-Corrosive Water-Reducing, Accelerating Admixture: ASTM C 494, Type C or E.

1. Products: Subject to compliance with requirements, provide one of following:
   a. “Eucon AcN-Series,” “Accelguard 80,” “Accelguard NCA,” or “Accelguard 90,” by Euclid Chemical Company.
   b. “DCI,” “PolaraSet,” “Lubricon NCA,” “Daraset” or “Gilco,” by W.R. Grace & Co.
   c. “Pozzutec 20+” or “Pozzolith NC 534,” by BASF Construction Chemicals.
   d. “Sika Set NC,” “Plastocrete 161FL”, or “Sika Rapid-1,” by Sika Corporation.
   e. “Catexol 2000 RHE,”by Axim Concrete Technologies.
   f. “Polychem NCA” or “Polychem Super Set,” General Resource Technology.
   g. “LCNC-166,” Russ Tech Admixtures, Inc.

L. Water-Reducing or Retarding Admixture: ASTM C 494, Type D or B.

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

   a. “Eucon Retarder-75”, “Eucon DS” or “Eucon W.O.” Euclid Chemical Co.
   b. “Daratard-17” or “Recover,” W.R. Grace & Co.
   c. “Pozzolith Series” or “Delvo Series,” BASF Construction Chemicals.
   d. “Sikatard Series,” or “Plastiment Series” or “Plastocrete Series,” Sika Corporation.
   e. “Polychem R,” General Resource Technology.
   f. “LC-400 Series” or “LC-500 Series,” Russ Tech Admixtures, Inc.

M. Corrosion Inhibiting Admixture shall be 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. “Eucon CIA” or “Eucon BCN,” Euclid Chemical Company.
   b. “DCI” or “DCI-S,” W.R. Grace.
   c. “Rheocrete CNI,” BASF Construction Chemicals.
   d. “Sika CNI,” Sika Corporation.
   e. “Catexol 1000 CN-CI,” Axim Concrete Technologies.
   f. “Polychem CI,” General Resource Technology.
   g. “Russ Tech RCI,” Russ Tech Admixtures, Inc.

2. Add at rate of 3 gal/cu yd of concrete, which shall inhibit corrosion to 9.9 lb of chloride ions per cu. yd. of concrete. Calcium Nitrite based corrosion inhibitor shall have a concentration of 30 percent, plus or minus 2 percent of solids content.

N. Shrinkage Compensating 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. Provide powdered admixture used for the compensation and reduction of shrinkage in Portland Cement concrete. Its functional mechanism shall be based on the formation of an expansive Type G component, which produces a calcium hydroxide platelet crystal system based on calcium aluminate/calcium hydroxide, as specified in ACI 223.
3. Acceptable Product:
   a. Conex by The Euclid Chemical Company.
   b. “Eclipse Plus,” W.R. Grace & Co.
   c. “Tetraguard AS 20,” BASF Construction Chemicals.
   d. “Sika Control 40,” Sika Corporation.
   e. “SRA-157,“ Russ Tech Admixtures, Inc.

2.5 CURING MATERIALS

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

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry. Materials must be free of harmful substances, such as sugar or fertilizer, or substances that may discolor the concrete. To remove soluble substances, burlap should be thoroughly rinsed in water before placing it on the concrete.

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

D. Water: Potable.

E. Clear, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

F. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

G. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.6 CONCRETE MIXES

A. Comply with ACI 301 requirements for concrete mixtures.

B. Prepare design mixes, proportioned according to ACI 301, for normal weight concrete determined by either laboratory trial mix or field test data bases, as follows:

1. Compressive Strength (28 Days): 5000 psi.
2. Maximum w/cm ratio: See Drawing Notes.
3. Air Content: See Drawing Notes.
4. Maximum Permissible Cementitious Material Content:
   a. Fly Ash: 25 per cent
   b. Slag: 50 per cent
   c. Silica Fume: 10 per cent
   d. Fly Ash plus Slag plus Silica Fume: 50 per cent
   e. Fly Ash plus Silica Fume: 35 per cent

5. Slump: 4 inches (100 mm).
   a. Slump Limit for Concrete Containing High-Range Water-Reducing Admixture: Not more than 8 inches (200 mm) after adding admixture to plant- or site-verified, 2- to 3-inch (50- to 75-mm) slump.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with ASTM C 94 and ASTM C 1116.

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

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

2.8 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. Product shall be capable of achieving bond strength of 2,700 psi per ASTM C 882.

1. Acceptable materials for this Work are:
   a. "Duralprep A.C." by The Euclid Chemical Company, Cleveland, OH.
   b. "Sika Armatec 110 EpoCem", by Sika Corporation, Lyndhurst, NJ.
   c. Other types may be used only with Engineer/Architect's approval in writing prior to bidding.

B. Epoxy Adhesive: 2 or 3 component, 100 percent solids, 100 percent reactive compound suitable for use on dry or damp surfaces. Product shall be capable of achieving bond strength of 1,800 psi per ASTM C 882.

1. Acceptable materials for this Work are:
   a. "MasterEmaco P 124" or "MasterEmaco ADH 326," by BASF Construction Chemicals, Shakopee, MN.
   b. "Kemko 001 or 008", by ChemCo Systems, Inc., Redwood City, CA.
   c. "Euco #452 Epoxy Series," or "Duralcrete Epoxy Series", by The Euclid Chemical Company, Cleveland, OH.
   d. Sikadur 32 Hi-Mod LPL", by Sika Corporation, Lyndhurst, NJ.
   e. Other types may be used only with Engineer/Architect's approval in writing prior to bidding.

C. Joint Fillers

1. Joint filler in slabs and curbs per ASTM D1751 Asphalt impregnated fiber board; as shown on Drawings. Acceptable products as follows:
   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.

2.9 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. Acceptable tool: “Soff-Cut Saw Model 310” or “Model G2000,” Soff-Cut International, Corona, CA.

      1) Cut joint as soon as concrete will support weight of operator and saw without deforming.
      2) Joint shall be 1 in. deep for concrete thickness of 4 in. or less. Joint shall be 1.5 in. deep for concrete exceeding 4 in. thickness. Do not cut reinforcement.
      3) Extend joint to adjacent vertical surface within 30 minutes of cutting.
      4) Retool or grind sawcut joint before installing sealant to provide equivalent dimensions, shape and volume as joint obtained by tooled joint. Surface width shall be 0.5 in. with 3/16 to 1/4 in. edge radius.

B. All joints subject to acceptance by sealant installer. Concrete contractor to rework rejected joints until acceptable to sealant installer.

PART 3 - EXECUTION

3.1 PRECONSTRUCTION MEETING

A. Conduct a preconstruction meeting addressing the concrete preparation, installation, protection, quality control, and acceptance of Work.

3.2 FORMWORK

A. Design, construct, erect, shore, brace, and maintain formwork according to ACI 301.

3.3 STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.4 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Locate and install so as not to impair strength or appearance of concrete, at locations indicated or as approved by Engineer.

C. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint filler full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

3.5 CONCRETE PLACEMENT

A. Comply with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

B. Do not add water to concrete during delivery, at Project site, or during placement.

C. Consolidate concrete with mechanical vibrating equipment.

3.6 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch (6 mm) in height rubbed down or chipped off.

1. Apply to concrete surfaces not exposed to public view.

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.

3.7 FINISHING NON-FORMED SURFACES

A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on the surface.

1. Do not further disturb surfaces before starting finishing operations.

C. Nonslip Broom Finish: Apply a nonslip broom finish to surfaces indicated 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.

3.8 TOLERANCES

A. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

3.9 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. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.1 lb/sq. ft. x h before and during finishing operations. Apply material according to manufacturer's written instructions one or more times after placement, screeding and bull floating concrete, but prior to float finishing. Repeated applications are prohibited after float finishing has begun.

1. Acceptable evaporation retarder materials for this Work are:
   a. "Cimfilm", by Axim Concrete Technologies.
   b. "MasterKure ER 50," by BASF Construction Chemicals, Shakopee, MN.
   c. "Aquafilm", by Conspec Marketing & Manufacturing Co., Inc.
   d. "Sure-Film (J-74)', by Dayton Superior Corporation.
   e. "Eucobar", or "Tamms Surface Retarder", by The Euclid Chemical Company, Cleveland, OH.
   f. "E-Con", by L&M Construction Chemicals, Inc.
   g. "EVRT", by Russ Tech Admixtures, Inc.
   h. "SikaFilm", by Sika Corporation, Lyndhurst, NJ.

C. Immediate upon conclusion of finishing operation cure concrete in accordance with ACI 308 for duration of at least seven days by moisture curing or moisture retaining covering. Dissipating curing compounds complying with ASTM C309 may be used in accordance with recommendations of ACI 506.7, "Specification for Concrete." Provide additional curing immediately following initial curing and before concrete has dried.

1. Continue method used in initial curing.
2. Material conforming to ASTM C171.
3. Other moisture retaining covering as approved by Engineer/Architect.
4. During initial and final curing periods maintain concrete above 50°.
5. Prevent rapid drying at end of curing period.

D. Concrete surfaces to receive slab coatings or penetrating sealers shall be cured with moisture curing or moisture-retaining cover**.**

E. Dissipating Curing Compound [(VOC Compliant, less than 350 g/l)]: Comply with ASTM C 309, Type 1, Class A or B. Moisture loss shall be not more than 0.55 kg/m^2 when applied at 200 sq. ft/gal. Manufacturer's certification is required. Silicate based compounds are prohibited.

1. Subject to project requirements provide one of the following products:
   a. "Kurez DR VOX" or "Kurez RC," or "Kurez RC Off," The Euclid Chemical Company.
   b. "RxCure WB," or "RxCure VOC" or "W.B. Cure VOC," Conspec Marketing & Manufacturing.
   c. "MasterKure CC 200 WB" or "MasterKure CC 160 WB," BASF Construction Chemicals.

2. Additional requirements:
   a. With product submittal provide plan and procedures for removal of residual curing compound prior to application of sealers, coatings, stains, pavement markings and other finishes.
   b. Provide a summary of testing to show adequate surface preparation for successful application of sealers, coatings, stains, pavement markings, and other finishes.

F. 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 (300 mm), 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 uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.10 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.

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.

2. 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.

3.11 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.

END OF SECTION 033021

APPENDIX:

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

[1] example: Footings, interior flatwork, floor slabs, wear slabs, 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

III. MATERIALS:		
Aggregates: (size; type; source; gradation report; specification)		
Coarse:		
Fine:		
Other Materials:	Type	Product-Manufacturer (Source)
Cement:		
Fly ash, or slag,		
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 or slag		
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.

V. RATIOS			VI. SPECIFIC GRAVITIES
Water[1]	lb.	=	Fine Aggregate:
Cementitious Material[2]	lb.	=	Coarse Aggregate:
Fine Agg.	lb.	=	
Total Agg.	lb.	=	

NOTES:
[1]Includes ALL water, including added water and free water contained on aggregates.
[2]Cementitious materials include cement, fly ash, slag, silica fume, HRM, Processed Ultra-Fine Fly Ash or other pozzolan.

VII. ADMIXTURES				
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		

VIII. STANDARD DEVIATION ANALYSIS:	Yes	N/A
(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".)		
Number of Tests Evaluated: (One test is average of two cylinder breaks) Attach copy of test data considered:	Standard Deviation: (Single Group) Standard Deviation: (Two Groups)	
Required average compressive strength: f'cr = f'c + _____ psi		
NOTE: 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: (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) (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.)		
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 = _____ %		

IX. TRIAL MIXTURE TEST DATA:	Yes	N/A
(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".)		

Age (days)	Mix #1 (comp. str.)	Mix #2 (comp. str.)	Mix #3 (comp. str.)
7			
7			
28			
28			
28			
28 day average compressive strength, psi			

NOTE:
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:

(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

For post-tensioning projects, see also special requirements for strength required to apply initial post-tensioning.

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 = _____ %	

X. OTHER REQUIRED TESTS		
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. Remarks:

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

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 C1260, ASTM C 1567 or CE CRD-C662 Test report for each aggregate

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 concrete repair mortar to formed horizontal, vertical and overhead surfaces to restore original surface condition and integrity. Repairs to be form and pour/pump. All cementitious materials shall have an integral corrosion inhibitor.

B. Related Sections: Following Sections contain requirements that relate to this Section:

1. Division 01 Section "Submittal Procedures."
2. Division 02 Section "Work Items."
3. Division 02 Section "General Concrete Surface Preparation."
4. Division 02 Section "Surface Preparation for Patching."
5. Division 07 Section “Joint Sealants.”

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.

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.

D. See requirements of Division 01 Section, “Submittal Procedures,” Part 1 heading, “Submittal Procedures,” for limits to re-submittals.

E. See requirements of Division 01 Section, “Submittal Procedures,” Part 2 heading, “Requests for Information,” for RFI constraints.

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. Horizontal Repair and Form and Pour Mortar: 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. 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 Corporation.
      b. "Eucocrete," by Euclid.
      c. "FA-S10 Concrete," by King.
      d. "Sikacrete 211," by Sika.
      e. Other types may be used only with Engineer's approval in writing prior to bidding.
   2. Acceptable polymer modified materials for this Work are as follows:

      a. "MasterEmaco T310 CI" by BASF Corporation.
      b. "Sika Repair 222 with Latex R," "SikaTop 111 Plus", or "Sikacrete 211 SCC+," by Sika
      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.

B. 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 Corporation.
      b. "Speedcrete 2028," by Euclid.
      c. "HP-S10 Concrete," by King.
      d. "Sikaquick 1000," by Sika.
      e. "Aprisa P-80," by Tomes.
      f. Other types may be used only with Engineer's approval in writing prior to bidding.

C. 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. Acceptable materials for this Work are as follows:
      a. “MasterEmaco N425,” by BASF Corporation.
      b. “Verticoat Supreme,” by Euclid.
      c. “Super-Top,” by King.
      d. “Sikaquick VOH,” by Sika.
      e. “CT-40 Do All Mortar,” by Tomes.
      f. Other types may be used only with Engineer's approval in writing prior to bidding.

D. Section ‘033021’ for concrete reinforcing and formwork requirements.

2.3 MATERIAL ACCESSORIES

A. Extended Open Time Epoxy Bonding Agent: Not applicable to project

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Cavity surfaces shall be clean and dry prior to commencement of patch installation. Preparation of cavity to receive new mortar shall be in accordance with Section "Surface Preparation for Patching” and manufacturer's instructions.

3.2 INSTALLATION

A. Repair Mortar Bonding Grout:

   1. If contractor chooses to use a mortar bonding grout, mix and apply repair/patching mortar bonding grout in strict accordance with manufacturer's recommendations.
   2. If repair/patching mortar bonding grout dries, cavity shall not be patched until it has been cleaned again and prepared as specified in Section "Surface Preparation for Patching." Repair mortar/patching grout shall not be applied to more cavities than can be patched within 0.25 hr by available manpower.

B. Mortar Placement: Mortar materials shall be placed immediately following repair/patching mortar bonding grout application 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. Fresh repair/patching mortar bonding grout is required between successive lifts of mortar material.

C. Form and Pour/Pump Repair Mortar Placement: All vertical and overhead repair patches shall be formed and poured/pumped unless directed otherwise by engineer/architect. Mortar materials shall be placed [a minimum of 2 hours and no more than the Manufacturer's recommended open time after application of the extended open time epoxy bonding agent immediately following the bonding grout application]. Mix and apply in strict accordance with manufacturer's written instructions, to achieve a maximum 9" slump.

D. 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 is required between successive lifts of patching material.**

E. Finishing:
1. Apply a nonslip 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.

3.3 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 **[three] [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 slab coatings or penetrating sealers 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.

3.4 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 Concrete Testing: Determine strength at 3, 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 Mortar Testing: Determine strength at 3, 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: Bond testing shall be performed at 7 days in accordance with ASTM C1583.

3.5 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 033761

SECTION 03 63 00 - EPOXY INJECTION SYSTEMS

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 prepare cracks in structural concrete members and inject them with a 2-component, moisture-insensiteve, 100 percent solids, low-viscosity epoxy resin system.

B. Related Sections: Following Sections contain requirements that relate to this Section:

1. Division 01 Section "Submittal Procedures."
2. Division 02 Section "Work Items."
3. Division 02 Section "General Concrete Surface Preparation."
4. Division 02 Section "Surface Preparation for Patching and Overlay."

1.3 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 362), American Concrete Institute.
4. ”Specification for Crack Repair by Epoxy Injection” (ACI 503.7), American Concrete Institute.
5. “Guide for the Application of Epoxy and Latex Adhesives for Bonding Freshly Mixed and Hardened Concretes”, (ACI 503.6), American Concrete Institute.

6. "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.
7. "Guide for Repair of Concrete Bridge Superstructures" Reported by ACI Committee 546 (ACI 546.1).

C. Contractor shall have following ACI/ICRI publications at Project construction site at all times:

1. ”Specification for Crack Repair by Epoxy Injection” (ACI 503.7), American Concrete Institute.” Structural Crack Repair by Epoxy Injection”, ACI RAP Bulletin 1, 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.

1.4 SUBMITTALS

A. Make submittals in accordance with requirements of Division 01 and as specified in this Section.

B. Contractor: Submit manufacturer's product data sheets, technical sheets, recommended application procedures and information on epoxy injection equipment.

C. See requirements of Division 01 Section, “Submittal Procedures,” Part 1 heading, “Submittal Procedures,” for limits to resubmittals.

D. See requirements of Division 01 Section, “Submittal Procedures,” Part 2 heading, “Requests for Information,” for RFI constraints.

1.5 WARRANTY

A. System manufacturer and Contractor shall furnish Owner written single source performance guarantee that epoxy resin injection system will be free of defects related to design, workmanship or material deficiency **for 3-year period** from date of acceptance of Work required under this Section against leakage or bond failure:

1. Any adhesive or cohesive failure.
2. Crazing or other weathering deficiency.
3. Normal abrasion or tear failure.

B. Any repair under this guarantee shall be done at no cost to Owner. Guarantee shall be provided by Contractor and manufacturer of system.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Injection epoxy shall be one of following:

1. "MasterInject 1380" or “MasterInject 1500” as manufactured by BASF Construction Chemicals., Shakopee, MN.
2. "Sikadur 35 Hi-Mod LV" or “Sikadur 52” as manufactured by Sika Chemical Corporation, Lyndhurst, NJ.
3. "Epoxy HP-LV" as manufactured by Hunt Process Corp-Southern, Ridgeland, MS.
4. “Pro-Poxy 50 Super LV” as manufactured by Unitex, Kansas City, MO.
5. “Eucopoxy” or “Duralcrete LV” as manufactured by The Euclid Chemical Company, Cleveland OH.
6. “Sure Inject J56 SLV” as manufactured by Dayton Superior Corp., Miamisburg OH.
7. “KonTek 11 LV” as manufactured by Contech Group, Inc. Seattle, WA.
8. “Kemko 038” as manufactured by ChemCo Systems, Inc., Redwood City, CA.

B. Epoxy gel shall be as specified by the selected injection epoxy manufacturer.

C. Equipment:

1. Epoxy injection unit shall be portable and equipped with positive displacement-type pumps with interlock to provide positive ration control of epoxy injection resin components. Pumps shall be air or electric powered and shall provide in-line mixing and metering system and shall be equipped with drain-back plugs.
2. Equipment used to inject epoxy shall be capable of following:

    a. Automatic proportioning of materials within mix ratio tolerances set by epoxy resin manufacturer.
    b. Delivery of components, resin and hardeners, from separate reservoirs to mixing type discharge head.
    c. Complete and uniform mixing of components at discharge head.
    d. Injection of resin system at constant pressures not to exceed 150 psi.

PART 3 - EXECUTION

3.1 PREPARATION

A. Crack Identification:

1. All cracks 0.03 in. wide or greater that are designated by Engineer/Architect, and not coincident with principal delamination, shall be injected. Cracks that occur coincident with principal delaminations shall not be injected.
2. Cracks requiring repair shall be located by Contractor at time of construction and marked with chalk.

B. Crack Preparation for Injection:

1. Surface of concrete adjacent to crack must be free of all laitance, efflorescence, dirt or foreign particles.
2. Cracks may be damp or dry as per injection material manufacturer's recommended installation procedures.
3. All cracks shall be properly sealed along their exposed length with an approved epoxy gel.
4. Epoxy injection ports shall be uniformly spaced along crack and shall be installed as recommended by system manufacturer. If concrete member being injected is exposed on both sides, provide injection ports on opposite sides at staggered intervals.
5. Apply epoxy gel around injection port to provide an adequate seal to prevent escape of injection resin from perimeter of port while under pressure.
6. Apply epoxy gel for sealing in manner that will result in minimal defacing or disorganization of concrete substrate.

3.2 INSTALLATION

A. Epoxy Injection:

1. Dispense epoxy injection resin under constant pressure in accordance with manufacturer's recommended procedures or as required to achieve maximum filling and penetration of crack without inclusion of air voids in epoxy resin material.
2. Injection shall begin at lowest port and progress incrementally higher.
3. Appearance of epoxy resin at next higher port shall be considered evidence of successful crack filling.
4. If penetration of epoxy resin into cracks is not possible, notify Engineer/Architect prior to discontinuing injection procedures. If alternate injection procedures are possible, submit procedure in writing to Engineer/Architect for review.
5. Contractor shall adhere to all limitations and cautions for epoxy resin injection material as per manufacturer's current printed literature.

B. Cleaning:

1. When cracks are completely filled, allow adhesive to cure for sufficient time to allow the removal of the surface seal without any draining or runback of epoxy material from the cracks.
2. Remove the surface seal material, ports, and injection adhesive runs or spills from concrete surfaces.
3. Finish the face of the crack flush to the adjacent concrete, removing any indentations or protrusions caused by the placement of entry ports.
4. Match work area to adjacent surface including any surface treatments.

END OF SECTION 03 63 00

SECTION 04 20 10 – UNIT MASONRY

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Furnish face brick under the Face Brick Allowance specified in Division 01 Section "Summary of Work."

B. Submit samples for **concrete masonry units, face brick.**Comply with ACI 530.1/ASCE 6/TMS 602.

C. Construct a sample wall panel approximately 48 inches (1200 mm) long by 48 inches (1200 mm) high to demonstrate aesthetic effects and qualities of materials and execution.

PART 2 - PRODUCTS

2.1 MASONRY UNITS

A. Concrete Masonry Units: ASTM C 90; Weight Classification, **Lightweight**

1. Special shapes for lintels, corners, jambs, sash, control joints, and other special conditions.
2. **Square-edge** units for outside corners, unless otherwise indicated.
3. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2000 psi (13.8 MPa).
4. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less-than-nominal dimensions.

B. Face Brick: ASTM C 216, Grade **SW** Type **FBS**
1. Size: **Standard**
2. Solid brick with exposed surfaces finished for ends of sills and caps.
3. Special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

2.2 MORTAR

A. Mortar: **ASTM C 270**
1. Do not use calcium chloride in mortar.
2. For masonry below grade, in contact with earth, reinforced masonry, and where indicated, use T**ype S**

3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions, and for other applications where another type is not indicated, use **Type N**

2.3 GROUT

A. CMU grout: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476, and Contract Drawings for specified 28-day compressive strength indicated, but not less than 3000 psi (20.7 MPa).
3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.

B. Application: Use epoxy pointing mortar for exposed mortar joints with pre-faced CUMs.

2.4 JOINT REINFORCEMENT, TIES, AND ANCHORS

A. Provide joint reinforcement formed from galvanized carbon-steel wire conforming to ASTM A 951/A 951M.
1. Interior Walls: Hot-dip galvanized carbon steel with ASTM A 153/A 153M, Class B-2 coating.
2. Exterior Walls: Hot-dip galvanized carbon steel with ASTM A 153/A 153M, Class B-2 coating
3. Wire Diameter for Side Rods: [0.1483 inch (3.8 mm)]
4. Wire Diameter for Cross Rods: [0.1483 inch (3.8 mm)]
5. For single-wythe masonry, provide [ladder design]
6. For multi-wythe masonry, provide [ladder design with 3 side rods
7. Veneer Anchors: 2-piece adjustable masonry veneer anchors allowing vertical or horizontal differential movement between veneer and wall framing parallel to plane of wall but resisting tension and compression forces perpendicular to it, for attachment over sheathing to studs, and acceptable to authorities having jurisdiction.

B. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by ¼ inch (6.4 mm) thick by 24 inches (600 mm) long, with ends turned up 2 inches (50 mm) or with cross pins.

2.5 EMBEDDED FLASHING MATERIALS

A. Sheet Metal Flashing: Stainless-steel, 0.0156 inch (0.4 mm) thick. or 0.0135 inch (0.3 mm) thick for fully concealed flashing,

B. Laminated Flashing: 3 oz./sq. ft. (0.9 kg/sq. m) copper sheet bonded with asphalt between 2 layers of glass-fiber cloth.

C. Rubberized Asphalt Sheet Flashing: Pliable and highly adhesive rubberized asphalt compound, 26 mils (0.7 mm) thick, bonded to a polyethylene film, 4 mils (0.1 mm) thick, to produce an overall thickness of 30 mils (0.8 mm).

2.6 MISCELLANEOUS MASONRY ACCESSORIES.

A. Weep Holes: Round polyethylene tubing, 3/8-inch (9.5-mm) OD

B. Loose-Granular Perlite Insulation: ASTM C 549, Type II or IV.

C. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV.

D. Polyisocyanurate Board Insulation: FS HH-I-1972/1, Class 2.

2.7 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Dur-O-Wal; a Hohmann & Barnard company.
    b. Heckmann Building Products, Inc.
    c. Hohmann & Barnard, Inc.
    d. Wire-Bond

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cut masonry units with motor-driven saws. Install cut units with cut surfaces and, where possible, cut edges concealed.

B. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

C. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

D. Stopping and Resuming Work: In each course, rack back units; do not tooth.

E. Fill cores in hollow concrete masonry units with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

F. Build non-load-bearing interior partitions full height and install compressible filler in joint between top of partition and underside of structure above.

G. Tool exposed joints slightly concave when thumbprint hard, unless otherwise indicated.

H. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush.

3.2 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).

1. Space reinforcement not more than 16 inches (406 mm) o.c.
2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions

3.3 LINTELS

A. Install steel lintels where indicated.

B. Masonry lintels where shown. Precast lintels made from concrete matching concrete masonry units in color, texture, and compressive strength and with reinforcement bars indicated or required to support loads indicated.

C. Minimum bearing of 8 inches (200 mm) at each jamb, unless otherwise indicated.

3.4 FLASHING AND WEEP HOLES

A. Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.

B. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing before covering with mortar.

1. Extend flashing 4 inches (100 mm) into masonry at each end and turn up 2 inches (50 mm) to form a pan.

C. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

3.5 CLEANING

A. Clean stone masonry veneer as work progresses. Remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, remove large mortar particles and scrub unit masonry.

1. Wet wall surfaces with water, apply cleaner, then remove cleaner by rinsing thoroughly with clear water.

END OF SECTION 04 20 10

SECTION 07 18 00 – 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 water proofing system including all products specified in following Sections:

1. Division 07 Section, “Traffic Coatings”
2. Division 07 Section, “Concrete Joint Sealants”
3. Division 07 Section, “Expansion Joint Assemblies”

B. Materials shall be compatible with materials or related Work with which they come into contact, and with materials covered by this Section.

C. Related Sections: Following Sections contain requirements that relate to this Section.

1. Division 03 Section, "Cast-in-Place Concrete."
2. Division 07 Section, “Expansion Joint Assemblies”

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. 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.

D. 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 MOCK-UP

A. Contractor is required to install a mock-up at least 100 SF in area. The intent of the mock-up is for the Owner to verify correct coarseness of aggregate and color that match the contractor provided samples during the submittals stage of the project. If the mock-up is accepted by the Owner, it will be incorporated into the final coating product.

1.5 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. One 4 in. by 4 in. stepped sample showing each component for each system indicated.

C. Sample Warranty: For each system indicated.

1.6 INFORMATION SUBMITTALS

A. Certificates

1. Certification that products and installation comply with applicable federal, state where project is located, 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.

1.7 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.

1.8 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 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 this project is being constructed.
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).

1.9 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.

C. Do not store material on slabs to be post-tensioned before final post-tensioning of slabs is accomplished. At no time shall weight of stored material being placed on slab area, after post-tensioning is completed and concrete has reached specified 28 day strength, exceed total design load of slab area. Between time final post-tensioning is accomplished and time concrete has reached specified 28 day strength, weight of stored material placed on slab area shall not exceed half total design load of slab area.

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.

1.11 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: length of warranty, change in value of warranty – if any- based on length of remaining warranty period, transferability of warranty, responsibilities of each party, notification procedures, dispute resolution procedures, and limitations of liability for direct and consequential damages.

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. Polycoat Products Division of Amer. Polymers (Polycoat), Santa Fe Springs, CA.
8. Pecora Corporation (Pecora), Harleysville, PA
9. Sika Corporation (Sika), Lyndhurst, NJ.
10. Technical Barrier Systems, Inc. (TBS), Oakville, Ontario.
11. Tremco (Tremco), Cleveland, OH.

2.2 MATERIALS, TRAFFIC COATING

A. Acceptable [**low odor**] coatings are listed below. Coatings shall be compatible with all other materials in this Section and related work.

1. Hybrid VOC Compliant, Extreme Low Odor, High-Solids, Heavy Duty Coating System:

    a. AutoGard E, Neogard.
    b. Iso-Flex 750EU HVT, Lymtal.
    c. Kelmar FCW III, Exposure 3, TBS.
    d. MasterSeal Traffic 2530, BASF.
    e. Qualideck (152/252/532E/512), APT
    f. Sikalastic 22 Lo-Mod Hybrid (720/22 LM/745 AL), Sika.
    g. Vulkem EWS, Tremco

B. Provide ultraviolet screening for all traffic coating placed on this project.

C. Finish top coat shall be colored grey. If multiple shades of grey are available from the manufacturer, contractor shall provide Owner available colors for selection.

D. Aggregate shall be #3 flint. Aggregate shall be broadcast to rejection.

E. 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, Lymtal.
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 used 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 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. Prepare by sandblasting all surfaces inaccessible to shotblast equipment. Mechanically remove bonded thermoplastic directional arrows where required.

D. 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.

E. All cracks on concrete surface shall be prepared in accordance with manufacturer's recommendations.

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. Crack preparation including installation of joint sealant material, where required, is incidental to traffic coating work.

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 should include all of the following steps:

1. Surface Preparation: Prepare concrete 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.
7. Top Coat: Lock aggregate into place, provide a maintainable surface and provide resistance to ponding water, UV degradation, color loss and chemical intrusion.

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. 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 40ºF.

E. **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) and islands**.

F. Complete all Work under this Section before painting line stripes.

G. 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.

END OF SECTION 07 18 00

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Manufactured through-wall flashing
2. Formed steep-slope roof sheet metal fabrications.

1.3 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.

7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim

C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of coping and roof edge flashing

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.9 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period**10** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes of 120 deg. to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

1. Brushed Satin (Lacquered): M32-06x (Mechanical Finish: directionally textured, medium satin; with clear organic coating); coating of "Incralac," waterborne**,** methyl methacrylate copolymer lacquer with UV inhibitor, applied by air spray in two coats per manufacturer's written instructions to total thickness of 1 mil (0.025 mm).
2. Mirror Polished (Lacquered): M22-06x (Mechanical Finish: buffed, specular; with clear organic coating); coating of "Incralac," waterborne**,** air-drying, methyl methacrylate copolymer lacquer with UV inhibitor, applied by air spray in two coats per manufacturer's written instructions to total thickness of 1 mil (0.025 mm).

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
   1. Factory Prime Coating: Where painting after installation is required, pretreat metal with white or light-colored, factory-applied, baked-on epoxy primer coat; minimum dry film thickness of 0.2 mil (0.005 mm).

C. Zinc-Tin Alloy-Coated Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead-soft, fully annealed, stainless-steel sheet of minimum uncoated thickness indicated; coated on both sides with zinc-tin alloy (50 percent zinc, 50 percent tin), with factory-applied gray preweathering.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

      a. Follansbee Steel.
      b. Revere Copper Products, Inc.

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; non-perforated.

B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F (111 deg C); and complying with physical requirements of ASTM D 226/D 226M for Type I and Type II felts.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

      a. Atlas Roofing Corporation.
      b. Engineered Coated Products.
      c. Kirsch Building Products, LLC.
      d. SDP Advanced Polymer Products Inc.

C. Self-Adhering, High-Temperature Sheet: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Carlisle Coatings & Waterproofing Inc.
b. Carlisle Residential; a division of Carlisle Construction Materials.
c. Grace Construction Products; W.R. Grace & Co. -- Conn.
d. Henry Company.
e. Kirsch Building Products, LLC.
f. Metal-Fab Manufacturing, LLC.
g. Owens Corning.
h. Polyguard Products, Inc.
i. Protecto Wrap Company.
j. SDP Advanced Polymer Products Inc.

2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.
3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C) or lower.

D. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m)minimum.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal **or manufactured item** unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
4. Fasteners for Zinc-Tin Alloy-Coated Stainless-Steel Sheet: Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

F. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

G. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

I. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

J. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

K. Do not use graphite pencils to mark metal surfaces.

2.6 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:

1. Stainless Steel: **0.019 inch (0.48 mm** > thick.
2. Zinc-Tin Alloy-Coated Stainless Steel: **0.018 inch (0.46 mm)** thick.
3. Galvanized Steel: **0.028 inch (0.71 mm)** thick.
4. Aluminum-Zinc Alloy-Coated Steel: **0.028 inch (0.71 mm)** thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.

C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within 14 days.

D. Apply slip sheet, wrinkle free before installing sheet metal flashing and trim.

3.3 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
5. Torch cutting of sheet metal flashing and trim is not permitted.
6. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.

2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of [**10 feet (3 m)**] with no joints within 24 inches (600 mm) of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Architectural Joint Sealants."

G. Rivets: Rivet joints where necessary for strength.

3.4 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 04 Section "Unit Masonry."

C. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm beyond wall openings.

3.5 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

B. Overhead-Piping Safety Pans: Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

3.6 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.7 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 62 00

SECTION 07 92 33 –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 water proofing system including all products specified in the following Sections:
   1. Division 07 Section, “Joint Sealants”

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 penetrations identified on the Drawings.
      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 at tiers exposed directly to weather.
      f. Other joints as indicated on the Drawings.

1.3 ACTION SUBMITTALS

A. Product Data: For each system indicated at least 7 days prior to application.

   1. Product description, technical data, appropriate applications and limitations.
   2. Primer type and application rate

B. Sample Warranty: For each system indicated.

1.4 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. 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.

1.5 CLOSEOUT SUBMITTALS

A. Final executed Warranty.

1.6 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. 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.

C. 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).

1.7 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. At no time shall weight of stored material being placed on slab area, after post-tensioning is completed and concrete has reached specified 28 day strength, exceed total design load of slab area. Between time final post-tensioning is accomplished and time concrete has reached specified 28 day strength, weight of stored material placed on slab area shall not exceed half total design load of slab area.

1.8 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.

1.9 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: length of warranty, change in value of warranty – if any- based on length of remaining warranty period, transferability of warranty, responsibilities of each party, notification procedures, dispute resolution procedures, and 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. Dow Corning Corp. (Dow Corning), Midland, MI.
2. Lymtal International Inc. (Lymtal), Lake Orion, MI.
3. Pecora Corporation (Pecora), Harleysville, PA.
4. Sika Corporation (Sika), North Canton, OH.
5. 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 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-901, Vulkem 45SSL, 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. Acceptable silicone vertical and cove joint sealants (non-traffic bearing):

1. Spectrem 1 or Spectrem 4-TS, Tremco.
2. 311-NS, Pecora.
3. Dow Corning NS Parking Structure Sealant, Dow Corning.

K. 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. Check preparation of substrate for adhesion of sealant.

F. 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 40ºF.

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 lesser of 1% of total lineal footage placed or total of 100 lineal ft of joint sealant at isolated/random locations (varying from in. to ft of material) for Engineer/Architect and Manufacturer's Representative inspection of sealant profile.
2. Contractor, at Engineer/Architect's direction, shall install 3 trial joint sections of 20 ft each. Contractor shall cut out joint sections, as selected by Engineer/Architect, for Engineer/Architect and Manufacturer's Representative inspection. Additional isolated/random removals may be required where sealant appears deficient. Total cut out sealant shall not exceed lesser of 1% of total lineal footage placed or total of 100 lineal ft of joint 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 at no cost to Owner.

END OF SECTION 07 92 33

SECTION 07 92 36 – ARCHITECTURAL JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.

B. Related Requirements:
1. Section 079233 "Concrete Joint Sealants" for sealing joints in horizontal traffic-bearing areas and vertical joints in concrete.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

1.4 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.5 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

B. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 50, NT: Single-component, non-sag, plus 50 percent and minus 50 percent movement capability, non-traffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dow Corning Corporation.
b. GE Construction Sealants; Momentive Performance Materials Inc.
c. May National Associates, Inc.; a subsidiary of Sika Corporation.
d. Pecora Corporation.
e. Sika Corporation.

2.3 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Non-staining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. BASF Corporation-Construction Systems.

b. Construction Foam Products; a division of Nomaco, Inc.

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

a. Metal.
b. Glass.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 92 36

SECTION 07 95 00 – 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 water proofing system including all products specified in the following Sections:

1. Division 07 Section, “Traffic Coatings”
2. Division 07 Section, “Water Repellents”
3. Division 07 Section, “Concrete Joint Sealants”
4. Division 07 Section, “Expansion Joint Assemblies”

B. This Section includes the following:

1. Standard expansion joint systems:

    a. Elastomeric concrete edged, extruded rubber joint system
    b. Metal Edged, extruded rubber joint system
    c. Adhered extruded rubber joint system
    d. Reinforced rubber pad (nosepad), blockout mounted, mechanically anchored extruded rubber joint system
    e. Extruded neoprene closed cell rubber joint system.
    f. Premolded – factory formed sealant system
    g. Field applied Silicone sealant system

2. Seismic slide plate expansion joint seismic systems
3. Vertical expansion joint systems
4. Pedestrian rated hinged cover plate system
5. Secondary moisture containment system
6. Split slab membrane system – extruded rubber joint systems for plaza systems exteriors.

C. Related Sections: The following Sections contain requirements that relate to this section:

1. Division 03 Section "Cast-in-Place Concrete".
2. Division 03 Section “Precast Structural Concrete”.
3. Division 03 Section “Precast Architectural Concrete”.
4. Division 04 Section "Unit Masonry" for masonry wall joint systems.

5. Division 07 Section "Fire-Resistive Joint Systems" or “Firestopping”.
6. Division 07 Section "Concrete Joint Sealants" for liquid-applied joint sealants.
7. Division 09 Section “Pavement Markings”.

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 prestressing, 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 ¼" 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 shown on drawings.
b. Where installation temperature is other than specified temperature, perform calculations showing joint is capable of movement within design temperature range (Criteria on Drawings) for "other" temperature, 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. Preinstallation 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 Section, “Submittal Procedures:”

1. See requirements of Division 01 Section, “Submittal Procedures,” Part 1 heading, “Submittal Procedures,” for limits to resubmittals.
2. See requirements of Division 01 Section, “Submittal Procedures,” Part 2 heading, “Requests for Information,” for RFI constraints.

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°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, blockout 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.

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. 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.

C. Installer Qualifications: An employer of workers, including superintendent for this project, trained and approved by manufacturer.

D. 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 Joint and Several Warranty commencing with date of acceptance of work.

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. 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 expansion joints will be free of defects, water penetration and chemical damage related to system design, workmanship or material deficiency, consisting of: 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 Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

2.2 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).

2.3 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.
9. ZB 200/400 Series, C/S.

B. Field applied silicone sealant expansion joint system:

1. Dow Corning FC parking structure sealant (fast cure), Dow Corning.
2. Wabo®SiliconeSeal Two-Part Silicone, WBA.
3. Spectrem 800/900SL, Tremco.

C. 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.

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 40ºF.

D. During months when historic mean daily temperature at Project is more than 19° F. colder than annual mean daily temperature, premolded sealant shall be installed on temporary basis to prevent hot weather buckling. Provide permanent installation during acceptable weather conditions.

E. Terminate exposed ends of joint assemblies with field- or factory-fabricated termination devices.

F. 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.

G. 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 for full 12 hours.

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 07 95 00

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems:
   1. Previously painted steel.
   2. Previously painted concrete.
   3. Spot locations of bare concrete.
   4. Bare concrete masonry units (CMU).

1.2 DEFINITIONS

A. MPI Gloss Level 1 (Matte Finish): Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 3 ('Egg-Shell-Like' Finish): 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 4 ('Satin-Like' Finish): 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 5 (Semi-Gloss): 35 to 70 units at 60 degrees, according to ASTM D 523.

E. MPI Gloss Level 6 (Gloss): 70 to 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

   1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
   2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

   1. Submit Samples on rigid backing, 8 inches square.
   2. Apply coats on Samples in steps 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: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

E. Sample Warranty: For each system indicated.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials**, from the same product run,** that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Quantity: 5 **gal.** of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. Pre-construction Testing:

1. No testing has been performed on the existing coating. There are no existing records for paint type and/or lead/hazardous material content.

1.6 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.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.8 WARRANTY

A. Paint Materials: Furnish Owner with written **10-year** warranty that paint products will not experience the following due to material defects:

1. Check, crack, blister, or delaminate from the substrate.
2. Fade or change color.
3. Weather or exhibit loss of gloss.
4. Chalking.

B. Paint System (Includes Preparation & Installation Procedures): Furnish Owner with written **5-year** Warranty, detailing responsibilities of manufacturer and applicator with regard to warranty requirements. Warranty shall state that Paint system will be free of any defects listed under note 1.8A above related to material deficiency as well as any deficiencies related to preparation or installation procedures for a period of 5 years from date of Substantial Completion.

C. Perform any repair under this warranty at no cost to Owner.

D. Address and state 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Behr Process Corporation.
2. Benjamin Moore & Co.
3. Dunn-Edwards Corporation.
4. Glidden Professional.
5. Kelly-Moore Paint Company Inc.
6. PPG Architectural Finishes, Inc.
7. Pratt & Lambert.
8. Sherwin-Williams Company (The).
9. Tnemec

2.2 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 50 g/L.
3. Dry-Fog Coatings: 150 g/L.
4. Primers, Sealers, and Undercoaters: 100 g/L.
5. Rust-Preventive Coatings: 100 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
7. Pretreatment Wash Primers: 420 g/L.

D. Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 GENERAL INFORMATION

A. Preparation and painting are required as described in this Section and noted on the Drawings and in Section 020010.

B. Minor items that are not specifically listed may also require preparation and painting as part of base bid work scope and are incidental to the project scope of work.

C. 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 (incidental).

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 the Work.

B. Remove all debonded coatings. Remove all laitance and surface contaminants, including oil, grease, and dirt as specified by manufacturer’s written recommendations to provide warranty.

C. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMUs): 12 percent.
3. Gypsum Board: 12 percent.

D. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

G. Elements requiring preparation and painting as part of the base bid work scope include, but are not limited to, those listed on page 1 of this Section. Minor items that are currently painted, but are not specifically listed, also require preparation and painting as part of base bid work scope and are incidental to the project scope of work.

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 hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
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 dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

E. Existing Painted Substrates: Remove all failed existing coatings, dirt, grease and material that could inhibit bond of new over-coat paint materials.
1. Perform power washing preparation to all surfaces/substrates as outlined elsewhere in this specification document.
2. **At all areas where existing coating is not intact after power washing, perform additional mechanical preparation** to remove unsound coatings, corrosion, etc. down to bare metal as outlined elsewhere in this specification document.
3. Transitions between different layers of substrates/coatings shall be mechanically feathered together to provide a sound and tight transition for over-coating.

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. Disconnect and/or protect existing drainage system.

G. **Perform additional mechanical preparation to remove unsound coatings, corrosion, etc. down to bare metal or concrete as outlined elsewhere in this specification document.**

H. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

I. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

J. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.

K. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

L. Galvanized-metal substrates should not be chromate passivated (commercially known as "bonderized") if primers are field applied. If galvanized metal is chromate passivated, consult manufacturers for appropriate surface preparation and primers.

M. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

N. All existing painted surfaces shall be cleaned and prepared according to SSPC-SP12/NACE 5 “Surface Preparation and Cleaning of Steel and Other Hard Materials by High and Ultra-high Pressure Water Jetting Prior to Recoating”. High-Pressure Water Cleaning (HP WC) as defined by SSPC (5,000 – 10,000 PSI) to a WJ-4 visual condition of surface cleanliness, and SC-2 non-visual condition of surface cleanliness shall be utilized and is the basis for bidding.
   1. Trial preparation area using minimum 5,000 PSI water shall be performed to determine final water pressure and cleaning techniques. Equipment shall utilize a rotary nozzle and alkaline detergent designed for preparing existing paint coatings for over-coating. Resultant surfaces after cleaner application, dwell time, and high-pressure water cleaning at appropriate pressure and volume shall be: all surfaces free from loose coatings, dirt, grease, chalk/oxidation, and contaminants (including chlorides and salt contaminants). Cleaning/preparation shall be approved by Owner’s Representative, and by representative of paint manufacturer.
   2. Protect all elevators from dust and water entering into shaft.
   3. Proper containment, collection and disposal of preparation debris shall be the responsibility of the contractor.

O. Corroded and/or exposed steel shall be prepared by one of the following:
   1. SSPC-SP11 “Power Tool Cleaning to Bare Metal”

2. SSPC-SP6 “Commercial Blast Cleaning” (note applicable regulations regarding sandblasting work if this preparation method is employed)
3. Proper containment, collection and disposal of preparation debris shall be the responsibility of the contractor.
4. All abrasive blasting work shall comply with Federal, State and Local requirements for this type of work, including Allegheny County Health Department regulations.
5. Costs for all abrasive blasting permits or other regulatory fees shall be the responsibility of the Contractor and shall be included in the contract cost.

P. **All Painting Work Items**: 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.

Q. 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.

R. 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 and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. **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. Application of multiple coats may be required to provide uniform color and appearance acceptable to Owner / Engineer.**

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 Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.7 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 Substrates, Non-traffic Surfaces:

1. Latex System MPI EXT 3.1A:

a. Prime Coat: Primer, alkali resistant, water based, MPI #3.

1) Benjamin Moore; Ultra Spec - Masonry Int/Ext 100 Acrylic Sealer.
2) Sherwin-Williams; Loxon - Loxon Concrete & Masonry Primer.
3) PPG Architectural; PPG Paints – Seal Grip Int/Ext Acrylic Universal Primer/Sealer.
4) Equivalent products by other manufacturers and approved by Architect/Engineer.

b. Topcoat: Latex, exterior, flat (MPI Gloss Level 1), MPI #10.

1) Benjamin Moore; Ultra Spec – Exterior Satin Finish.
2) Sherwin-Williams; SuperPaint – Exterior Satin Flat.

3) PPG Architectural; PPG Paints – Ultra-Hide 150 Exterior Acrylic Satin.
4) Equivalent products by other manufacturers and approved by Architect/Engineer.

D. CMU Substrates:

1. Latex System MPI EXT 4.2A:

a. Prime Coat: Block filler, latex, interior/exterior, MPI #4.

1) Benjamin Moore; Ultra Spec - Int/Ext High-Build Masonry Block Filler.
2) Sherwin-Williams; PrepRite – Int/Ext Block Filler.
3) PPG Architectural; PPG Paints - Speedhide Int/Ext. Masonry Hi Fill Latex Block Filler.
4) Equivalent products by other manufacturers and approved by Architect/Engineer.

b. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15.

1) Benjamin Moore; Ultra Spec - Exterior Satin Finish.
2) Sherwin-Williams; SuperPaint – Exterior Latex Satin.
3) PPG Architectural; PPG Paints - Speedhide Exterior 100% Acrylic Latex Satin.
4) Equivalent products by other manufacturers and approved by Architect/Engineer.

E. Steel and Iron Substrates:

1. Alkyd System MPI EXT 5.1D:

a. Sealer Primer Coat:
1) Sherman-Williams; Macropoxy 920 Pre-prime
2) Tnemec; As recommended by Tnemec
3) Carboline; Rustbond
4) Equivalent products by other manufacturers and approved by Architect/Engineer.

b. Primer Coat (Over Prepared Bare Metal):
1) Sherman-Williams; Macropoxy 646
2) Tnemec; 135 Chembuild
3) Carboline; Carbomastic 15
4) Equivalent products by other manufacturers and approved by Architect/Engineer.

c. Intermediate Coat Over Prepared Existing Sound Paint or One Coat of Primer):
1) Sherman-Williams; Macropoxy 646
2) Tnemec; 135 Chembuild

3) Carboline; Carbomastic 15
4) Equivalent products by other manufacturers and approved by Architect/Engineer.

d. Top Coat Over Prepared Existing Sound Paint or One Coat of Primer):
1) Sherman-Williams; High Solids Polyurethane
2) Tnemec; EnduraShield 74 Polyurethane or UVX Series 750
3) Carboline; Carbothane 133
4) Equivalent products by other manufacturers and approved by Architect/Engineer.

END OF SECTION 099113

SECTION 099120 - PAVEMENT MARKING

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 paint systems for the **high build, two coat systems** for the items of types, patterns, sizes, and colors described in this article.

B. Provide the following systems as shown on Drawings:

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 as described in the following paragraphs:

1. Paint the vertical surface and the first 6 in. of the abutting horizontal surface at the top of all pedestrian curbs. At all other curbs and islands, paint the vertical surface and the entire horizontal surface (including PARCS equipment islands) within parking facility.
2. In parking areas and/or at streets and sidewalks within the project limits or constructed as part of this project, paint curb ramps (including flares), curb returns at curb ramps and any projecting elements at edges of accessible ramps without handrails. Paint curb returns at driveways and paint curb minimum of 3 ft either side of curb ramp or driveway, (or curb ramp flare length, whichever is greater) in accordance with Pavement Marking.
3. 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, joint sealants, caulking and all other surface treatments as specified in Division 07.

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 and/or occupancy of the parking area. 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.

E. Contractor shall verify that paint materials are compatible with new and existing traffic topping systems prior to application.

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 the following:
      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.

2.3 COLOR OF PAINT

A. Color of paint shall match existing, unless noted otherwise on Contract Drawings:

   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. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. 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.

D. Striping shall not be placed until full cure of concrete slab. Concrete surfaces generally require 30 to 90 days @ 70°F or higher.

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 otherwise noted on Contract Drawings.

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 paint in 2-coat system; first coat shall be 50% of total 15 wet mil minimum thickness, not to exceed 8 mils**. First coat shall be cured prior to installation of second

coat. At Contractor's option, one coat may be applied before substantial completion, with a second coat delayed for 3-6 months until weather conditions are appropriate and the concrete has cured sufficiently for proper adhesion.

1. Two coat system total wet mil thickness of 0.015 in (0.381 mm).
2. Two coat system total wet mil thickness of 0.018 to 0.025 in (0.457 – 0.635 mm) When Type IVA beads are used.
3. Two coat system total wet mil thickness of 0.015 to 0.018 in (0.381 – 0.457 mm) When Type IVB beads are used.

B. 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 40º F and rising, unless manufacturer requires higher minimum temperature. Maximum relative humidity shall be as required by manufacturer.

C. All lines shall be straight, true, and sharp without fuzzy edges, overspray or non-uniform application. Corners shall be at right angles, unless shown otherwise, 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).

END OF SECTION 099120