PROJECT MANUAL
FOR
Wayne State University

UNIVERSITY SERVICES BUILDING
BASEMENT STRUCTURAL REMEDIATION
WSU PROJECT #: 060-256694

Detroit, Michigan

OWNER:
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Design & Construction Services
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Detroit, MI 48202

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CARL WALKER, INC. PROJECT NO. R4-2015-019

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DATE: February 17, 2016
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END OF SECTION 00 0110
PART 1 - GENERAL

1.1 Related Documents
   A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

1.2 Description of the Work
   A. The Work contemplated by the Contract Documents includes the Work of all trades required and all the labor, equipment, materials, and supervision necessary and incidental to the restoration of the WSU University Services Building Basement.
   B. Work will be performed at locations within the structure as shown on the Drawings.
   C. Main items of the Work required in these areas are described in the Drawings and Specifications.
   D. It shall be understood that where additional Work is described, but not specifically located and/or shown on the Drawings, the Contractor shall be responsible for locating and marking areas to be repaired.

1.3 Work by Others
   A. The Owner may have other Work occurring within or adjacent to the Parking Structure at the same time as this Project. This Contractor shall cooperate at all times with the Owner to ensure that all Work proceeds without delay to scheduled completion.

1.4 Work Sequence
   A. Prior to commencement of Work, Contractor shall meet with Owner and Engineer to establish sequence and schedule of Work.
   B. Contractor shall notify Owner at least 24 hour prior to beginning any demolition or abrasive blasting operations.
   C. Contractor shall remove all broken concrete and debris from areas exposed to public view and dispose of same.
   D. Contractor shall remove dust and air transported abrasive from the remainder of the facility at the conclusion of abrasive blasting or demolition operations.
1.5 Project Meetings
   A. Refer to Section 01 3100 - Project Management and Coordination.

1.6 Contractor Log
   A. Contractor shall furnish and maintain one (1) log book at the Project site. Enter into this log each day:
      1. Weather conditions and temperature
      2. General progress of the Project
      3. Materials received
      4. Amount of materials placed
      5. Tests made
      6. Inspections made by other authorities
      7. All visitors to the Project site
      8. Unresolved problems
   B. Submit for record one copy of the log to the Engineer weekly. Refer to the following page for sample log sheet indicating minimum requirements.

1.7 Examination of Site
   A. The contractor shall visit the site of the Work, compare the Drawings and Specifications and other Contact Documents with existing conditions, including other’s work, if any, being performed. Failure to visit the site shall in no way relieve the Contractor from the necessity of furnishing of materials or performing any work that may be required to complete the work in accordance with the Contract Documents.

1.8 Verification of Existing Dimensions
   A. Where the installation of new construction is dependent on existing dimensions, the Contractor requiring shall be responsible for the verification of existing dimensions prior to the construction or fabrication of materials.

PART 2 - PRODUCTS

2.1 Not used.

PART 3 - EXECUTION

3.1 Not used.
CONTRACTOR'S LOG

Date:__________  Weather Conditions
Job Location:__________  Time:__________
General Contractor:__________  Temp:__________

Wind: 0-5 mph 5-10 mph 10-up
Humidity:  Low - Med - High
Sky: Clear - Hazy - Overcast - Rain

No. of Workers on Site:______________
Sub-Contractors on Site:______________

Work Performed

Inspections, Tests Performed

Unresolved Problems

Materials Received

Change Orders Received

Visitors  Representing

CC To:  Signed:_______________________
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PART 1 - GENERAL

1.1 Description

A. The conditions of the Contract for the General Requirements of Division I are hereby made a part of this Section.

B. This Section specifies procedures for allowances which shall be included in the Contract Price Base Bid per the Contract Documents. Allowances have been established to defer to a later date the determination of the actual cost for work which the exact quantity cannot be determined at the time of bidding and to defer selection of actual materials and equipment.

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

D. The following descriptions of the allowances describe the extent of the work in general. Detailed requirements may be specified in the various sections of the Specifications.

1. Allowance No. 1: Include a lump sum of $3,000 for the removal and replacement of damaged electrical conduit, junction boxes, etc.

PART 2 - PRODUCTS

2.1 Not Used.

PART 3 - EXECUTION

3.1 Not Used.

END OF SECTION 01 2100
PART 1 - GENERAL

1.1 Related Documents

A. The General Conditions of the Contract for Construction and the General Requirements of Division I of the specifications apply to the Work in this Section.

1.2 Summary

A. This Section specifies administrative and procedural requirements for Alternates.

B. An Alternate is an amount proposed by Bidders and stated on the Bid Form for certain construction activities defined in the Bidding Requirements that may be added to or deducted from Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in methods described in Contract Documents.

C. The Owner reserves the right to reject all Alternates or accept any Alternates in order or combination and to determine the low bidder for each classification of Work on the basis of the sum of the base bid and the Alternates accepted.

1.3 Coordination

A. Coordinate related Work and modify or adjust adjacent Work as necessary to ensure that Work affected by each accepted Alternate is complete and fully integrated into the project.

1.4 Notification

A. Immediately following the award of the Contract, prepare and distribute to each party involved, notification of the status of each Alternate. Indicate whether Alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to Alternates.

1.5 Schedule

A. A "Schedule of Alternates" is included at the end of this Section. Specifications Sections referenced in the Schedule contain requirements for materials and methods necessary to achieve the Work described under each Alternate.

B. Include as part of each Alternative, miscellaneous devices, accessory objects and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.
PART 2 - PRODUCTS

2.1 Not used.

PART 3 - EXECUTION

3.1 Schedule of Alternates

A. Alternate 1:

1. Remove and replace concrete sidewalk at the west side of the structure as indicated on drawing SR102 and detail 9 on drawing SR501.

B. Alternate 2:

1. Remove and replace concrete apron at the vehicular entrance/exit at Ferry Street at the north side of the structure as indicated on drawing SR102. Replace traffic detector loops, compact soil, add MDOT Class II fill as needed, and match thickness, slope and size of existing concrete apron.

C. Alternate 3:

1. Provide voluntary alternate to accelerate construction schedule. Provide description of how you plan to accelerate schedule (double shift, weekend work, large crew, etc.). Provide alternate schedule showing proposed duration and completion date. Provide cost, if any, to complete work in accordance with the proposed accelerated construction schedule.

END OF SECTION
SECTION 01 2900 – PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 Related Documents
   A. The General Conditions of the Contract for Construction and the General Requirements of Division I of these Specifications apply to the Work in this Section.

1.2 Project Pricing
   A. Bidder shall complete Section 00 4100, Bid Form, including all requested information.
   B. Project pricing is a combination of lump sum work items and unit price work items. Refer to below and Section 00 4100.

1.3 Unit Prices
   A. Bidders shall submit unit prices for each unit price item listed in Section 00 4100, Bid Forms. The amount of each unit price shall be stipulated in the space provided in the Bid Form.

1.4 Lump Sum Prices
   A. Bidder shall submit lump sum prices for each lump sum item listed in Section 00 4100, Bid Form. The amount of each lump sum price shall be stipulated in the space provided in the Bid Form.

1.5 Unit Price Quantity Measurement
   A. The Owner reserves the right to reject the Contractor’s measurement of work-in-place that involves use of established unit prices, and to have this Work measured by an independent surveyor acceptable to the Contractor at the Owner’s expense.
   B. Contractor shall maintain plan drawings locating all unit price repairs performed. Location and size of patches, overlays, etc. must be located on clean drawings. Separate drawings shall be maintained for each level and ceiling plan. Contractor shall submit copy of drawing identifying current quantities with each payment request. Work being invoiced must be properly identified. These drawings shall be incorporated into "Record Drawings" set required per Division 1.
   C. Quantity measurements shall be performed as described in Specification or shown on Drawings.
1.6 Schedule of Values

A. The Contractor shall prepare a Schedule of Values for his Work as required by Article 9.2 of the General Conditions.

B. Submit the Schedule of Values to the Engineer at the earliest feasible date, but in no case later than seven (7) days before the date scheduled for submittal of the initial Application for Payments.

C. Update and resubmit the Schedule of Values when change orders result in a change in the Contract Sum.

D. Use the project Bid Form, Section 00 4100, as a guide to establish the format for the Schedule of Values.

1.7 Application for Payment

A. The form of Application for Payment shall be notarized AIA Document G702, "Application and Certification for Payment," supported by AIA Document G703, Continuation Sheet.

B. Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.
   1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
   2. Include amount of change orders issued prior to the last day of construction period covered by the application.

C. Submit three (3) executed copies of each Application for Payment to the Engineer. One copy shall be complete, including waivers of lien and similar attachments, when required.

D. Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
   1. List of subcontractors
   2. List of principal suppliers and fabricators
   3. Schedule of Values
   4. Contractor's Construction Schedule (preliminary, if not final)
   5. Schedule of principal products
   6. Submittal Schedule (preliminary, if not final)
   7. List of Contractor's staff assignments
   8. List of Contractor's principal consultants
   9. Copies of permits
   10. Copies of authorizations and licenses from governing authorities for performance of the Work
11. Initial progress report
12. Certificates of insurance and insurance policies
13. Performance and payment bonds (if required)
14. Data needed to acquire Owner's insurance

E. Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
   1. Completion of Project closeout requirements
   2. Completion of items specified for completion after Substantial Completion
   3. Assurance that unsettled claims will be settled
   4. Assurance that Work not complete and accepted will be completed without undue delay
   5. Transmittal of required Project construction records to Owner
   6. Proof that taxes, fees and similar obligations have been paid
   7. Removal of temporary facilities and services
   8. Removal of surplus materials, rubbish and similar elements
   9. Warranties

1.8 Waivers of Mechanics Lien

A. With each Application for Payment submit waivers of mechanics liens from subcontractors or sub-subcontractors and suppliers for the construction period covered by the previous application.

B. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.

C. When an application shows completion of an item, submit final or full waivers.

D. The Owner reserves the right to designate which entities involved in the Work must submit waivers.

E. Submit waivers of lien on forms, and executed in a manner acceptable to the Owner.

PART 2 - PRODUCTS

2.1 Not used.

PART 3 - EXECUTION

3.1 Not used.

END OF SECTION 01 2900

CARL WALKER, INC.
PROJECT NO. R4-2015-019
PART 1 - GENERAL

1.1 Related Documents

A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

1.2 Meetings

A. Pre-construction Meeting: Scheduled within 21 days after contract award or notice to proceed, whichever is earlier.
   1. Place and Time: A central site and time, convenient to all parties, as designated by the Engineer.
   2. Attendance: Contractor's project manager, Contractor's field superintendent, major subcontractors, Owner's representatives, and Engineer's representatives.
   3. Suggested Agenda
      a. Project coordination
      b. Use of site
      c. Submittal and administrative procedures
      d. Schedules for construction
      e. Application for payment
      f. Record documents
      g. Construction facilities
      h. Aids and controls
      i. Security
      j. Complex structure requirements
      k. Insurance certificates
      l. Bonds
      m. Permits
      n. Contractor's log
      o. and other job-related subjects.

B. Progress Meetings: Periodic meetings as agreed to by Owner, Engineer, and Contractor and supplementary progress meetings specially called by Owner, Engineer, or Contractor.
   1. Place: Project field office of Contractor.
   2. Times: Established at pre-construction conference and subsequent meetings as required for progress of the work, generally at least twice per month during construction period.
   3. Attendance: Same as for pre-construction conference, as appropriate for the circumstances.
   4. Suggested Agenda
a. Review, approval of minutes of previous meetings
b. Review of work progress since previous meeting
c. Field observations, problems, conflicts
d. Problems that impede Construction Schedule
e. Review of off-site fabrication, delivery schedules
f. Corrective measures and procedures to regain projected schedule
g. Revisions to Construction Schedule
h. Coordination of schedules
i. Review of submittal schedules; expedite as required
j. Review proposed changes for:
   1) Effect on Construction Schedule and on completion date
   2) Effect on other contracts of the Project
k. And other business.

C. Work phase specific meetings refer to individual sections of the Specifications.

1.3 Procedures

A. The Engineer will act as chairman of the Pre-construction meetings; will prepare the minutes of each meeting, including names of participants, significant proceedings and decisions; and will distribute copies of minutes to the Contractor and the Owner. The Contractor shall be responsible for distributing copies to appropriate subcontractors and suppliers.

B. Representatives of the Contractor, subcontractors, and suppliers attending the meeting shall be qualified, familiar with pertinent details of the work, and authorized to act on behalf of the entity each represents.

C. When attendance is required by the Owner or Engineer, attendance shall be mandatory.

PART 2 - PRODUCTS

2.1 Not Used.

PART 3 - EXECUTION

3.1 Not Used.

END OF SECTION 01 3100
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for the submittal schedule, construction schedule, and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Submittals required for action and informational purposes are specified elsewhere.

C. Submittals not requested from the Contractor will be returned stamped “No Architect/Engineer’s Action Required.”

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals." Informational submittals may also be referred to as submittals “for record.”

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, testing, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. List and identify those submittals required early because of long lead time for manufacture or fabrication.
3. Submit concurrently with the first complete submittal of Contractor's construction schedule.
   a. Submit revised submittal schedule regularly to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
   a. Scheduled date for first submittal.
   b. Specification Section number and title.
   c. Submittal category: Action; informational.
   d. Name of subcontractor.
   e. Description of the Work covered.
   f. Scheduled date for Engineer's final release or approval.
   g. Scheduled date of fabrication.
   h. Scheduled dates for purchasing.
   i. Scheduled dates for installation.
   j. Activity or event number

1.5 INFORMATIONAL SUBMITTALS

A. Contractor's Construction Schedule: Prepare and submit within 10 days after the execution of the Contract a construction schedule in bar chart form or using a time-scaled Critical Path Method (CPM) for the Work. Extend schedule from date established for the execution of the Contract to date of final completion.
1. Prepare a list of all activities required to complete the work. Identify critical path activities. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.

2. Coordinate construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

3. Schedule shall include provisions for submittal review time, resubmittal review time, procurement time, material cure time, adverse weather, and constraints and work restrictions in the Contract Documents.

4. Schedules for restoration work shall indicate the areas to be closed during each phase of construction and shall indicate the proposed traffic flow for each phase.

1.6 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

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

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

2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

4. All submittals shall be received in an orderly sequence and sufficiently in advance of construction requirements to allow time for checking, resubmitting and rechecking.

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

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

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

1. Submittal Review: Allow 15 days for review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.

2. Resubmittal Review: Allow 15 days for review of each resubmittal.
3. Sequential Review: Where sequential review of submittals by Engineer's consultants, Owner, or other parties is needed, allow 21 days for review of each submittal.

C. Submittal Format:

1. Contractor may elect to provide submittals by paper submittals or electronic submittals. Format selected shall be used for entire project duration.
2. For projects where electronic submittals are provided, a corresponding paper submittal may also be required where indicated.
3. For projects where paper submittals are provided, Engineer may not return paper copies of submittals and may return submittals electronically.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
3. Include the following information for processing and recording action taken:
   a. Project name.
   b. Date.
   c. Name of Engineer.
   d. Name of Construction Manager.
   e. Name of Contractor.
   f. Name of subcontractor.
   g. Name of supplier.
   h. Name of manufacturer.
   i. Submittal number or other unique identifier, including revision identifier.
   1) Submittal number shall use Specification Section number followed by a dash and then a sequential number (e.g., 03300-01). Resubmittals shall include an alphabetic suffix after another dash (e.g., 03300-01-A).
   j. Number and title of appropriate Specification Section.
   k. Drawing number and detail references, as appropriate.
   l. Location(s) where product is to be installed, as appropriate.
   m. Other necessary identification.

4. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will return without review submittals received from sources other than Contractor.
a. Transmittal Form for Paper Submittals: Use transmittal form acceptable to Engineer and Owner, containing the following information:

1) Project name.
2) Date.
3) Destination (To:).
4) Source (From:).
5) Name and address of Engineer.
6) Name of Construction Manager.
7) Name of Contractor.
8) Name of firm or entity that prepared submittal.
9) Names of subcontractor, manufacturer, and supplier.
10) Category and type of submittal.
11) Submittal purpose and description.
12) Specification Section number and title.
13) Specification paragraph number or drawing designation and generic name for each of multiple items.
14) Drawing number and detail references, as appropriate.
15) Indication of full or partial submittal.
16) Transmittal number.
17) Submittal and transmittal distribution record.
18) Remarks.
19) Signature of transmitter.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
   a. File name shall use project identifier and Specification Section number followed by a dash and then a sequential number (e.g., WSUUSB-03300-01). Resubmittals shall include an alphabetic suffix after another dash (e.g., WSUUSB-03300-01-A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Engineer.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Engineer and Owner, containing the following information:
   a. Project name.
   b. Date.
   c. Name and address of Engineer.
5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
   a. Project name.
   b. Number and title of appropriate Specification Section.
   c. Manufacturer name.
   d. Product name.

F. Options: Identify options requiring selection by Engineer.

G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
   1. Note date and content of previous submittal.
   2. Note date and content of revision in label or title block and clearly indicate extent of revision. Clearly indicate all changes that have been made by clouding and use of revision number in a triangular symbol.
   3. Resubmit submittals until they are marked with approval notation from Engineer's action stamp.

I. Distribution: Furnish final submittals to Engineer, Owner, manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, testing agencies, and others as necessary for performance of construction activities. Show
distribution on transmittal forms. Format and quantities of final submittals shall be coordinated with each recipient.

J. Review of resubmittals by the Engineer shall be limited to required corrections only, and the Contractor by resubmitting shall represent that the resubmittals contain no other alternations, additions or deletions. If additional changes have been made, same shall be specifically noted and described on the resubmittal.

K. Use for Construction: Retain complete copies of submittals on Project site available for review. Use only final action submittals that are marked with approval notation from Engineer's action stamp. Contractor shall provide “Issued for Construction for Field Use” drawings as required for all field construction activities which shall be based on and referenced to final action submittals marked with approval notation from Engineer's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Submit electronic submittals via email as PDF electronic files.
   a. If electronic file size of submittal exceeds email size limits of either Contractor or Engineer, Contractor shall post to Project Web Site and notify Engineer via email that submittal has been posted.
   b. Engineer will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
2. Action Submittals: If paper copies are submitted or required, Submit three paper copies of each submittal unless otherwise indicated. Engineer will return two copies.
3. Informational Submittals: If paper copies are submitted or required, Submit two paper copies of each submittal unless otherwise indicated. Engineer will not return copies.
4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Modify standard drawings to delete information which is not applicable to project.
4. Show dimensions and clearances.
5. Supplement standard information to provide additional information applicable to project.
6. Include the following information, as applicable:
   a. Manufacturer's catalog cuts.
   b. Manufacturer's product specifications.
   c. Standard color charts.
   d. Statement of compliance with specified referenced standards.
   e. Testing by recognized testing agency.
   f. Application of testing agency labels and seals.
   g. Notation of coordination requirements.
   h. Availability and delivery time information.
7. Submit Product Data before or concurrent with Samples.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Notation of dimensions established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Highlight with notation, encircle, or otherwise indicate deviations from Contract Documents.
   h. Seal and signature of professional engineer if specified.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.

D. Samples: Submit Physical Samples for review and approval of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of
these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:

   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of applicable Specification Section.
   e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.

4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. The Engineer shall review and approve Contractor submittals such as schedules, products, materials, samples, and shop drawings for the limited purpose of conformance with the design concept and the information expressed in the Contract Documents.

6. The Engineer shall not be responsible for any deviations from the Contract Documents not brought to the attention of the Engineer in writing by the Contractor.

7. The Engineer shall not be required to review partial submittals or those for which submissions or correlated items have not been received. However, review of a specific item shall not indicate that the Engineer has reviewed the entire assembly of which the item is a component.

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

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

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

F. Contractor's Construction Schedule:

1. Contractor's Construction Schedule Updates: At bi-weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule before each regularly scheduled progress meeting. Issue schedule concurrently with each payment request.
   a. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
   b. Include a report with updated schedule that indicates every change, including, but not limited to, changes in critical path, activities, durations, and total float or slack time.
   c. As the Work progresses, indicate final completion percentage for each activity.

2. Recovery Schedule: When periodic updates indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

3. Distribution: Distribute copies of schedule to Engineer, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
   a. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 2900 "Payment Procedures."
1. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 4100 "Testing Laboratory."

2. Promptly submit a written report of each test and inspection for record required of the Contractor, PDF file and one (1) copy each to the Engineer and Owner. Each report shall include:
   a. Date issued
   b. Project title and number
   c. Testing laboratory name, address, and telephone number
   d. Name and signature of laboratory inspector
   e. Date and time of sampling or inspection
   f. Record of temperature and weather conditions
   g. Date of test
   h. Identification of product and Specification Section
   i. Location of sample or test in the Project
   j. Type of inspection or test
   k. Results of tests and compliance with Contract Documents
   l. Interpretation of test results, when requested by the Engineer.

H. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 7700 "Closeout Procedures."

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

J. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

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

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

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

N. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
O. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

P. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

Q. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

R. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW AND RESPONSIBILITIES

A. The submittals are not to be considered a part of the Contract Documents.

B. Submittals shall demonstrate the Contractor understands and has interpreted the intent of the design as detailed and specified in the Contract Documents. The Contractor shall check and approve submittals for accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes, construction precautions and verification of field dimensions or conditions. The Contractor's responsibility for errors and omissions in submittals is not relieved by Engineer's review of submittals.

C. All submittals to the Engineer shall be routed through the Contractor and bear the Contractor's Approval Stamp certifying they have been reviewed, checked, and approved for compliance with the Contract Documents. All submittals to the Engineer that are without this stamp of approval or that contain obvious errors or have not been checked or have been checked superficially will be returned unchecked and unstamped by the Engineer for resubmission by the Contractor.

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

D. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.

E. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 7700 "Closeout Procedures."

3.2 ENGINEER'S ACTION

A. The Engineer shall review and approve or take other appropriate action on the Contractor’s submittals, such as shop drawings, product data, samples and other data, which the Contractor is required to submit, but only for the limited purpose of checking for conformance with the design concept and the information shown in the Construction Documents. This review shall not include review of the accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes, construction means or methods, coordination of the work with other trades or construction safety precautions, all of which are the sole responsibility of the Contractor. Review of a specific item shall not indicate that the Engineer has reviewed the entire assembly of which the item is a component. The Engineer shall not be responsible for any deviations from the Construction Documents not brought to the attention of the Engineer in writing by the Contractor. The Engineer shall not be required to review partial submissions or those for which submissions of correlated items have not been received.

B. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:

1. The “actions taken” appearing on the Engineer’s Approval Stamp shall be defined as follows:

   a. “Approved” – Fabrication and/or installation may be undertaken. Approval does not authorize changes to the Contract Sum or Contract Time unless stated in separate letter or Change Order.

   b. “Furnish as Corrected” – Fabrication and/or installation may be undertaken. Exceptions as noted are to be incorporated. Approval does not authorize changes to the Contract Sum or Contract Time unless stated in separate letter or Change Order.

   c. “Revise and Resubmit” – Fabrication and/or installation MAY NOT be undertaken until exceptions as noted are incorporated and resubmitted for
approval. Revision does not authorize changes to the Contract Sum or Contract Time.

d. “Rejected” – Fabrication and/or installation MAY NOT be undertaken. Submittal is too incomplete or does not meet Contract Documents. Resubmit for approval.

e. “No Architect/Engineer’s Action Required” – Submittal not requested from the Contractor and was not reviewed.

C. Informational (or For Record) Submittals: Engineer will review each submittal for conformance with submittal requirements only and not its content. Engineer will not return the submittal, or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.

D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Engineer.

E. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

F. Submittals not required by the Contract Documents may be returned by the Engineer without action.

END OF SECTION 01 3300
CARL WALKER, INC
CONTRACTOR SUBMITTAL REVIEW LABEL

Project: ___________________________ Project No: ___________________________
Contractor: ___________________________ Subcontractor: ___________________________
Supplier: ___________________________ Manufacturer: ___________________________
Date: ___________________________ Revision Date: ___________________________

Submitted Product: ___________________________
Specification Section: ___________________________ ASTM NO or Federal Spec: __________
Specified Material?: Yes / No
Product Use: ___________________________ Ref Drwg # and Detail: ___________________________
Date Submittal Received by Carl Walker, Inc.: ___________________________
Carl Walker, Inc. Comments: ___________________________

Contractor Comments:

__________________________

Contractor's Approval Stamp

☐ Approved ☐ Rejected ☐ Revise and Resubmit
☐ Furnish as Corrected ☐ No Architect/Engineer's Action Required

This review is only for general conformance with the design concept of the project and the information given in the Construction Documents. Corrections or comments made on the shop drawings during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item shall not include approval of an assembly of which the item is a component. The contractor is responsible for dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of all other trades and performing all Work in a safe and satisfactory manner.

By: ___________________________ Date: __________

CARL WALKER, INC.
PART 1 - GENERAL

1.1 Related Documents

A. Conditions of Contract for Construction and General Requirements of Division 1 of these Specifications apply to Work of this Section.

B. All testing of concrete will conform to requirements of ACI 301-05, Standard Specifications for Structural Concrete and ACI 311.5R-02, Guide for Concrete Plant Inspection and Field Testing of Ready-Mixed Concrete. Specific project requirements or modifications are specified herein.

1.2 Work Included

A. Owner will employ and pay for services of an Independent Testing Laboratory approved by Engineer to perform testing as specified in this Section.

B. Contractor shall pay cost for all re-tests and related engineering services which indicate that initial tested items are not in accordance with Contract Documents, and for additional tests that are for his convenience.

1.3 Related Work

A. Following Work is related to this Section:
   1. Cast-In-Place Concrete  Section 03 3000
   2. Shotcrete  Section 03 3713

1.4 Quality Control (ACI 301 1.6) Additional requirements are as follows:

A. Laboratory will meet requirements of ASTM C 1077.

B. Laboratory will have been inspected by an independent agency such as Cement and Concrete Reference Laboratory CCRL or AASHTO Material Reference Laboratory AMRL.

C. Laboratory will meet "Recommended Requirements for Independent Laboratory Qualification," published by American Council of Independent Laboratories.
D. Laboratory will be authorized to operate in state in which Project is located.

E. An ACI certified Concrete Laboratory Testing Technician - Grade II will be responsible for concrete testing services.

F. An ACI certified Concrete Field Testing Technician - Grade I will be responsible for field testing services.

G. Employment of Laboratory will in no way relieve Contractor's obligations to perform Work of Contract.

1.5 Laboratory Responsibilities (ACI 301 1.6.4) Additional requirements are as follows:

A. Laboratory will cooperate with Engineer, Contractor, and Subcontractors in order to provide qualified personnel upon due notice.

B. All testing will be performed in a timely manner to prevent installation (or to allow for removal) of non-conforming material.

C. All tests will be reported in writing to Contractor, Subcontractor, Supplier, Installer, etc., Engineer, and Owner. Written reports of test results will be delivered to above parties within 48 hours of testing or by FAX if immediately requested. Each report will include, as a minimum, following:
   1. Report number
   2. Date issued
   3. Project title and number
   4. Name of Contractor and Subcontractor if applicable
   5. Supplier
   6. Testing Laboratory name, address, and telephone number
   7. Name and signature of Laboratory Field Technician
   8. Date and time of sampling or inspection
   9. Record of temperature and weather conditions
   10. Date of test
   11. Identification of product and Specification Section
   12. Location of sample or test in Project
   13. Type of inspection or test
   14. Results of tests and compliance with Contract Documents
   15. Interpretation of test results when requested by Engineer

1.6 Submittals

A. Upon request for review and approval certification and qualifications of Laboratory and Laboratory field Technicians.
1.7 **Specific Tests, Inspections and Methods Required**

**A. Excavating, Backfilling and Compaction**

1. Determine suitability of all materials to be used as fills, backfills, and leveling beds.
2. Perform one optimum moisture-maximum density curve in accordance with ASTM D1557 for each type of soil proposed for use.
3. One field density test for each 2500 square feet or fraction thereof of each in-place fill layer in accordance with either ASTM D1556, D 2167, or D 2922.
4. Provide daily inspection and reports for compaction work.
5. Confirm adequacy of bearing conditions for following:
   a. Slab-on-Grade

**B. Cast-In-Place Concrete (ACI 301 1.6.4 and ACI 311.5R-1.3, 2.4):** Comply also with testing requirements established in governing building codes. Additional requirements are specified as follows:

1. **Concrete Compression ASTM C 39.**
   a. Laboratory will have a compression machine capable of breaking 6" X 12" cylinders of 10,000 psi or be prepared to test 4" X 8" cylinders in accordance with ASTM standards.
   b. Take a minimum of six cylinders for each 50 cubic yards, or fraction thereof, of each mix design of concrete placed in any one day.
   c. Compression test sample size will be 6" x 12" cylinders except that 4" x 8" cylinders may be used for silica fume concrete.
   d. Compression tests
      1) Test 2 cylinders at 7 days.
      2) Test 2 cylinders at 28 days.
      3) Hold 2 cylinders in reserve for use as the Engineer directs.
   e. After 56 days, unless notified by the Engineer to the contrary, reserve cylinders may be discarded without being tested for specimens meeting 28 day strength requirements.

2. **Slump Test**
   a. Conduct one slump test per batch at the point of placement ASTM C 143.
      1) When water reducing admixtures or high range water reducing admixtures are added at job site, test concrete slump prior to addition of admixtures.

3. **Air Content Testing**
   a. Sample and test each batch of air entrained concrete delivered to project ASTM C 173 or ASTM C 231 and ASTM C 138.

4. **Ambient Air Temperature and Composite Concrete Sample Temperature.**
   a. Record temperatures for each batch of concrete ASTM C 1064.

5. **Corrosion Inhibitor Testing**
   a. Concrete Producer shall have corrosion inhibitor Manufacturer/Supplier perform following:
      1) Install a visual reference (such as a bottle or other approved device) for dispensing Calcium Nitrite corrosion inhibitor. Visual reference shall be
accessible to Independent Testing Laboratory, Manufacturer/Supplier's Representative, and Engineer.

2) Calibrate dispensing system at initial equipment installation and annually thereafter. Install tamper proof seals after each calibration of system.

b. Concrete plant operator shall perform following:
   1) Verify contents of visual reference (such as a bottle or other approved device) prior to discharge of product for each batch. If visual reference does not indicate specified amount of corrosion inhibitor, concrete plant operator shall stop production and notify corrosion inhibitor Manufacturer/Supplier immediately.

c. Independent Testing Laboratory shall perform following:
   1) Prior to and after each pour, take volume readings of corrosion inhibitor tank, correlate to size of pour, and report results to Engineer, corrosion inhibitor Manufacturer/Supplier, and concrete supplier. Volume used should be within +/- 10% of specified amount.
   2) Test plastic corrosion inhibitor concrete for presence of corrosion inhibitor in accordance with test method indicated in Appendix A. Test each concrete sample used for concrete compression test cylinders at rate of one test for each 50 cubic yards, or fraction thereof, of each mix design of concrete placed in any one day.

6. Submit for record field test reports including following information ACI 311.5R 2.5:
   a. Project information as specified herein
   b. Design mix number
   c. Design strength
   d. Cement content
   e. Water content
   f. Coarse aggregate lbs/yd
   g. Fine aggregate lbs/yd
   h. Admixtures
   i. Truck number and/or ticket number
   j. Drum rotation revolution
   k. Cubic yards
   l. W/C ratio
   m. Batch time
   n. Discharge start time
   o. Empty time
   p. Sample time
   q. Slump
   r. Air content
   s. Air temperature and concrete temperature
   t. Location of placement and location of sample batch

7. Submit for record laboratory test results including following information in addition to information cited under field tests.
   a. Cylinder identification
PART 2 - PRODUCTS

2.1 Not used.

PART 3 - EXECUTION

3.1 Not used.
Appendix A

Test method for Calcium Nitrite presence in plastic concrete.

Scope:

This method of test is used to determine presence of calcium nitrite in plastic concrete state. A freshly mixed concrete sample shall be tested. Quantofix test strips, for high range nitrite, manufactured by Gallard-Schlesinger Industries, Inc. of Carle Place, New York or equivalent, shall be used.

A. Apparatus

1. Quantofix Test Strips for high range nitrite #91322
   a. CTL Scientific (888) 686-3454
2. 10cc disposable syringes with Leur-Lok tip #309604
   a. Care Express (800) 339-3880
3. Disposable Filters 25mm/.45 micron #SLHAM3355
   a. Millipore (800) 645-5476
4. Wide-mouth Container
5. Clean Measuring Cup

B. Procedure

1. Add field concrete to pre-measured 2 liters of water in a wide mouth container. Use water in the container to rinse out measuring cup.
2. Shake container 2-5 minutes until contents are well mixed. As indicated in Column 2 of following Table, stated quantity of concrete, in millimeters, should be obtained in container.
3. Using syringe, uptake approximately 10 ml of extraction water from container. Attach a disposable filter to end of syringe.
4. Filter the extraction water into a clean cup.
5. Dip test strip into clear, filtered extraction water and compare color to chart on side of test strip container.
6. Use following chart to determine amount of concrete to be extracted, and expected readings on test strips:
### Table: Amount of Calcium Nitrate Added, liter/cu. Meters vs. Volume of Concrete to be Extracted, milliliters vs. Expected Reading on Test Strip

<table>
<thead>
<tr>
<th>Amount of Calcium Nitrate Added, liter/cu. Meters</th>
<th>Volume of Concrete to be Extracted, milliliters</th>
<th>Expected Reading on Test Strip</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.9</td>
<td>225</td>
<td>0.3</td>
</tr>
<tr>
<td>12.4</td>
<td>180</td>
<td>0.3</td>
</tr>
<tr>
<td>14.8</td>
<td>150</td>
<td>0.3</td>
</tr>
<tr>
<td>17.3</td>
<td>130</td>
<td>0.3</td>
</tr>
<tr>
<td>19.8</td>
<td>225</td>
<td>0.6</td>
</tr>
<tr>
<td>22.3</td>
<td>200</td>
<td>0.6</td>
</tr>
<tr>
<td>24.8</td>
<td>180</td>
<td>0.6</td>
</tr>
</tbody>
</table>

**Notes:**

Column 1 indicates amount of calcium nitrite, in liters, that has been added to a cubic meter of concrete.

Column 2 indicates amount of concrete that should remain in container after shaking.

Column 3 is test strip reading that will correspond to indicated quantity of calcium nitrite.

END OF SECTION 01 4100
SECTION 01 5000 – CONSTRUCTION FACILITIES AND TEMPORARY SERVICES

PART 1 - GENERAL

1.1 Related Documents
A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

1.2 Temporary Services General
A. Maintain strict supervision of use of temporary services. Enforce conformance with applicable standards. Enforce safe practices. Prevent abuse of services and systems. Prevent damage to finishes.

1.3 Temporary Electric
A. Electrical service is available at no charge to the Contractor from the electrical equipment room. Contractor may obtain temporary power for construction from this source, or may use own generator or the Contractor shall provide temporary electrical service.
B. Temporary power service shall comply with OSHA Standards. The Contractor shall maintain these temporary services in good order throughout the project until Work is complete. All extension cords shall be provided by the Contractor or Subcontractor requiring the power.
C. Electrical service shall not be used for heating.

1.4 Temporary Lighting
A. The Contractor shall provide all supplemental temporary lighting for the Project.
   1. Provide adequate illumination for Work being performed.
   2. Provide adequate illumination for safe movement of authorized persons through Project.
   3. Provide adequate illumination for public safety and special warning lighting for hazardous conditions.
   4. Provide adequate illumination required to protect the Project site from unauthorized entry.

1.5 Temporary Telephone Service
A. No telephones will be provided by Owner.
B. Contractor to provide telephone service as required.

1.6 Temporary Water
A. Sources of water are available at the site. The Owner will pay for reasonable amounts of water used for construction purposes.
B. The Contractor shall provide, at the earliest possible date, temporary connections to the water supply sources and maintain adequate distribution for all construction requirements. The Contractor shall protect sources against contamination and damage.

C. Methods of conveying this water shall be approved by the Engineer and shall not interfere with the Owner's operations.
   1. Prevent wasteful use of water. Protect system from freezing.

1.7 Temporary Heat

A. Provide temporary heat required by construction activities, for storing temperature-sensitive materials, for installing materials, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Maintain air temperature at a minimum of 50°F inside parking structure. Select safe equipment that will not have a harmful effect on completed installations or elements being installed.

1.8 Temporary Sanitary Facilities

A. Contractor shall not use Owner's sanitary facilities.

B. Contractor shall provide, pay for, and maintain sufficient and approved toilets with weather-proof enclosures all satisfactory to the local board of health and the Owner. Keep clean and sanitary at all times. Location shall be approved by Owner.

1.9 Existing and Temporary Fire Protection

A. Contractor shall provide adequate fire protection and fire prevention for the Project and in no case less than that required by applicable City, County, State, and Federal Laws.

1.10 Existing Utilities

A. Do not disturb existing utilities servicing adjacent buildings without written permission from Owner.
   1. Request shall be in accordance with utility implementation and termination schedule. When an implementation and termination schedule are not required, request shall be made not less than 10 days prior to such request for interruption.
   2. Damage to utilities shall be repaired immediately, to the full satisfaction of the Owner.
   3. Unscheduled interruptions of utilities shall be corrected immediately, to the full satisfaction of the Owner.

1.11 Protection of Existing Trees and Vegetation

A. Protect existing trees and other vegetation indicated to remain in place, against damage to roots, trunks or branches. Do not stockpile construction materials or excavated materials within drip line. Provide temporary guards to protect trees and vegetation to be left standing.

B. Repair or replace trees and vegetation damaged by construction operations, in a manner acceptable to the Engineer. Use a qualified tree surgeon to repair tree damage.
1.12 Protection of Works

A. The Contractor shall obtain the advice and recommendations of his installers for procedures to protect their work. Installers are responsible for protecting their work and that of other trades while working at the job site or in an area thereof. When the installer is no longer working in the area or at the job site, the Contractor shall provide protective measures and materials to assure that each element will be without damage or deterioration (other than normal weathering for exterior exposed materials) throughout the remainder of the construction period up to the date of substantial completion. Remove protective coverings and materials at the appropriate time, but no later than final cleaning operations.

B. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings. Protect finished floors and stairs from traffic, movement of heavy objects, and storage.

C. The general contractor shall maintain work area free of water; provide, operate, and maintain pumping equipment. Discharge water in accordance with requirements of public authorities.

1.13 Temporary Access

A. The Contractor shall not barricade, lock, or otherwise block emergency exiting from the building during construction.

B. Provide necessary signage at each building exit to notify Public "Exit closed due to construction – emergency exit only."

C. Construction temporary ramps and stairs to meet all code safety requirements, including handrails, etc. Maintain until no longer required.

1.14 First Aid

A. Contractor shall provide a first aid kit with adequate provisions for the materials being used on site. Contractor shall maintain an envelope to hang above the first aid kit which will contain all of the Health and Safety Data Sheets for materials being used on this Project.

1.15 Use of Parking Areas

A. Parking is at the Contractor’s own expense. Adequate public parking is available.

1.16 Barricades

A. Refer to Section 01 5600.

1.17 Security

A. The Contractor shall be responsible for the security of his work area and equipment.

B. Adequate precautions shall be taken to prevent unauthorized personnel from entering the job site.
1.18 Dust and Fume Control

A. Contractor shall take all necessary precautions to keep dust confined in the present work area.

B. Contractor shall be responsible for any damage to vehicles due to the construction.

C. Contractor shall submit to the Owner, for approval, proposed methods used to contain dust and fumes in work area.

D. Prevent hazardous accumulations of dusts, fumes, mists, vapors or gases in areas occupied during construction. Provide local exhaust ventilation to prevent harmful dispersal of hazardous substances into atmosphere of occupied areas. Dispose in manner that will not result in harmful exposure to persons. Ventilate storage spaces containing hazardous or volatile materials.

E. Water shall be used during concrete removal, saw cutting, etc. to contain dust.

1.19 Debris Control

A. Contractor shall remove all debris from areas exposed to public view on a weekly basis or more often as required to maintain a neat, clean site and dispose of same at authorized dump sites.

1.20 Construction Loads

A. Maximum construction loads of 30 pounds per square foot will be allowed on the parking ramp during construction.

1.21 Noise Control

A. Contractor shall review with the Owner the types of equipment which he proposes to use during normal business hours and obtain Owner’s approval for such use.

B. Conform with local city noise ordinance.

1.22 Staging Area

A. Contractor to coordinate with property contact for location of staging area.

1.23 Temporary Field Offices and Buildings

A. Contractor to provide temporary gang boxes for storage, tools, etc. Location to be approved by the Owner.

1.24 Jobsite Documents

A. The Contractor shall be provided with up to five sets of construction Drawings and Specifications. Additional sets will be provided upon request at cost.
B. The Contractor shall keep in the field office at all times, in addition to above, the following items:
   1. The most recent revision of the Drawings and specifications, including all changes made by addenda, sketches, bulletins, and change orders.
   2. Health and Safety Data Sheets
   3. The most recent issue of approved submittals. Obsolete or unapproved Submittals and Health and Safety Data Sheets shall not be kept at the jobsite.
   4. All material evaluation reports.

1.25 Video Tape Existing Conditions

A. Prior to beginning work, Contractor shall produce a video record of existing conditions in work areas, with emphasis on the commercial space. Provide three copies of video to the Owner. Coordinate walk-through production with Owner and Engineer.

PART 2 - PRODUCTS

2.1 Not used.

PART 3 - EXECUTION

3.1 Not used.

END OF SECTION 01 5000
SECTION 01 5526 – TEMPORARY TRAFFIC CONTROL

PART 1 - GENERAL

1.1 Related Documents

A. The Conditions of the Contract for Construction and the General Requirements of Division I of these specifications apply to the Work in this Section.

1.2 Traffic Control

A. Within 15 days after execution of the Contract, determine the vehicle and pedestrian traffic flow and the signage for each phase of construction to maintain the traffic flow throughout the parking structure.

B. Provide and maintain all drive lanes, entrances, exits, and safeguards required or necessary to the progress of the Work, and effectively control such traffic in a manner to provide minimum hazard to the Work and all persons.

C. Route all construction equipment, trucks, and similar vehicles via existing public streets to and from the structure as approved by the governing authorities and the Owner.

D. Maintain constant access for police, fire, and ambulance service.

E. Provide and maintain for proper control of traffic and safety of all concerned, including all necessary barricades, suitable and sufficient lights, reflectors and danger signals, warning and closure signs and directional signs.

F. Indicate by day and by night all restricted and dangerous conditions existing on or adjacent to the structure. Illuminate at night all barricades and danger signals, warning signs and obstructions. Keep all lights burning from sunset until sunrise.

G. Vehicle and pedestrian traffic flow inside and outside of the structure shall be maintained to provide easy entry and exit from the structure and to all parking areas.

1.3 Signage

A. Provide and maintain traffic signs through the duration of the Project to assist in traffic direction.

B. Provide signs necessary to inform visitors and employees of closings and traffic flow modifications, both inside and outside of the structure. Sign wording, appearance and placement shall be approved by Owner.
PART 2 - PRODUCTS

2.1 Frames may be new or used, wood or metal, in sound condition and structurally adequate.

2.2 Signs shall be a minimum of half-inch exterior grade plywood.

2.3 Lettering shall be a minimum height of four inches and stenciled.

2.4 Paint shall be exterior quality and the color of the lettering shall be black on a highway orange background.

PART 3 - EXECUTION

3.1 Install at a height of optimum visibility, on frames or attached to structural surfaces.

3.2 Relocate support signs as required by progress of the Work.

3.3 Maintain signs and supports in a neat, clean condition; repair damages to support or sign.

3.4 Remove signs, framing and supports at completion of Project.
SECTION 01 5600 – TEMPORARY BARRIERS AND ENCLOSURES

PART 1 - GENERAL

1.1 Related Documents

A. The Conditions of the Contract for Construction and the General Requirements of Division I of these specifications apply to the Work in this Section.

1.2 Barricades

A. Provide and maintain suitable barricades as required to prevent public entry, and to protect the Work, existing facilities, trees and plants from construction operations; remove when no longer needed, or at completion of Work. Barricades shall conform to city and state laws, ordinances, permit requirements.

B. The Contractor shall provide and maintain all necessary barricades for safe conduct of his work, or as required by federal, state or local laws or ordinances and in accordance with OSHA requirements and other requirements of this Specification.

C. Provide and maintain suitable barricades as required for protection of open excavations and post with warning lights.

1.3 Enclosures

A. Enclosures shall be sufficient to prevent entrance/exit or infiltration of rain, water, wind or other elements, and which will prevent undue heat loss from within an enclosed area.

B. Provide adequate ventilation and protection to provide construction personnel with safe working environment.

C. Prevent hazardous accumulations of dusts, fumes, mists, vapors, or gases in areas occupied during construction. Provide local exhaust ventilation to prevent harmful dispersal of hazardous substances into atmosphere of occupied areas. Dispose in manner that will not result in harmful exposure to person. Ventilate storage spaces containing hazardous or volatile materials.

D. Contractor shall submit to the Owner, for approval, proposed methods used to contain dust and fumes in work area.

E. Contractor shall be responsible for any damage to vehicles due to the construction.
1.4 Construction/Maintenance

A. Contractor shall be responsible for design, construction and maintenance of all barricades and enclosures.

PART 2 - PRODUCTS

2.1 Materials may be new or used, suitable for intended purpose.

PART 3 - EXECUTION

3.1 Installation

A. Install barricades and enclosures of a neat and reasonable uniform appearance, structurally adequate for the required purposes.

B. Maintain barricades and enclosures during entire construction period. Relocate barricades and enclosures as required with progress of construction.

3.2 Removal

A. Completely remove barricades and enclosures when construction has progressed to the point that they are no longer needed.

B. Clean and repair damage caused by installation of barricades and enclosures.

END OF SECTION 01 5600
PART 1 - GENERAL

1.1 Related Documents

A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

1.2 Material and Equipment

A. Comply with the applicable specifications and standards.

B. Comply with size, make, type, and quality specified.

C. Manufactured and fabricated products
   1. Design, fabricate, and assemble consistent with the current engineering and shop practices.
   2. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
   3. Two or more items of the same kind shall be identical, by the same manufacturer.

D. Do not use material or equipment for any purpose other than that for which it is designed or specified.

1.3 Manufacturer's Instructions

A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to the Engineer. Maintain one set of complete instructions at the job site during installation and until completion.

B. Handle, install, connect, clean, condition, and adjust products in strict accord with such instructions and in compliance with specified requirements.
   1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with the Engineer for further instructions.
   2. Do not proceed with work without clear instructions.

1.4 Transportation and Handling

A. Arrange deliveries of products in accordance with construction schedules, coordinate to avoid conflict with Work and conditions at the site.
1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals and that products are properly protected and undamaged.

B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.5 Storage and Protection

A. Store products in accord with manufacturer's instructions and as required by the technical specification, with seals and labels intact and legible.
   1. Store products subject to damage by the elements in weather tight enclosures.
   2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

B. Exterior storage
   1. Store fabricated products above the ground on blocking skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
   2. Store loose granular materials in a well drained area on solid surfaces to prevent mixing with foreign matter.

C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

D. Protection after installation
   1. Provide substantial coverings as necessary to protect installed products from damage from weather, traffic and subsequent construction operations. Remove when no longer needed.

PART 2 - PRODUCTS

2.1 Not used.

PART 3 - EXECUTION

3.1 Not used.
SECTION 01 7423 – FINAL CLEANING

PART 1 - GENERAL

1.1 Related Documents

A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these specifications apply to the Work in this Section.

1.2 Work Included

A. Facilities, equipment and labor for cleaning and waste disposal during construction and for final cleaning.

1.3 Responsibilities

A. Contractor and each subcontractor and installer is responsible for specific cleaning operations of his work to the extent specified in the appropriate Specification Sections.

B. Employ workmen or professional cleaners experienced in the specific cleaning operations.

1.4 Cleanup

A. Conduct clean up and disposal operations to comply with applicable anti-pollution laws and local ordinances.

1. Burning or burying of waste materials on the project site is not permitted.

2. Disposal of volatile fluids and wastes in storm or sanitary sewers, or into streams or waterways, is not permitted.

PART 2 - PRODUCTS

2.1 Cleaning Materials

A. Use cleaning materials for surfaces as recommended by Manufacturer.

PART 3 - EXECUTION

CARL WALKER, INC.
PROJECT NO. R4-2015-019
3.1 Cleanup

A. At the time each work task is completed, clean the area involved to a condition suitable for occupancy and restore minor or superficial damage. Replace units and elements which are damaged beyond successful repair.

B. Oversee cleaning and ensure that building, grounds, and public properties are maintained free from accumulation of waste materials and rubbish.

C. Take measures to prevent spread of trash, debris, cartons, packaging or other waste materials on or off the project site by wind.

D. Sprinkle dusty debris with water.

E. At reasonable intervals during progress of work, clean up site and access and dispose of waste materials, rubbish and debris.

F. Clean adjacent and nearby streets of dirt occasioned by construction operations; frequency and methods as required by governing authority.

G. Clean all surfaces of concrete paste.

3.2 Disposal

A. Each Contractor or Subcontractor, in addition to the responsibilities set forth in the General Conditions, shall at all times keep the premises free from accumulation of waste materials or rubbish caused by the Work or his employees.

B. Establish and enforce a daily system for collecting and disposing of waste materials from construction areas and elsewhere at the project site. Provide suitable trash containers at a central collection point on the site. Provide chutes or other suitable means for removing trash safely and cleanly from elevated portions of the work.

C. Contractor and each Subcontractor and Installer is responsible for cleaning and removal of his trash and debris to the collection point.

D. Do not hold collected materials at the site for periods of more than seven days. Handle hazardous, dangerous or unsanitary wastes separately from other waste materials, by containerizing properly. Dispose of each category of waste material in a lawful manner. Comply with federal, state, and local regulations for removal of combustible waste material and debris.

E. Concrete debris shall be removed from the site and legally disposed of by concrete installer.
3.3 Project Closeout

A. At the completion of the Project, the Contractor shall restore or replace all property damaged by his Work.

B. Final cleaning shall include, as a minimum:
   1. Remove grease, paint, dust, soil, stains, labels, fingerprints, writing, and other foreign materials from sight-exposed interior and exterior finished surfaces.
   2. Clean all hardware.
   3. Clean all plumbing fixtures.
   4. Clean all lighting fixtures.
   5. Repair, patch and touch up marred surfaces to specified finish to match adjacent surfaces.
   6. Clean all maintenance, storage and mechanical rooms in parking structure.
   7. Water blast floor surfaces at all Levels of Work performed.

END OF SECTION 01 7423
PART 1 - GENERAL

1.1 Related Documents

A. The Conditions of the Contract for Construction and the General Requirements of Division I of these Specifications apply to the Work in this Section.

1.2 Cleaning and Closeout

A. Refer to Section 01 7423 "Final Cleaning" for final cleaning of jobsite.

B. A punch list consisting of copies of the plans showing locations of unacceptable items and an attached explanation of the nature of the unacceptable work shall be delivered to the Contractor after substantial completion of the Project.

C. The Contractor shall submit "Record Drawings" after substantial completion of the project. The "Record Drawings" shall include, but not be limited to, the copies of the Drawings incorporating all changes and bulletins (enclosed in clouds), all shop drawings incorporating all changes (enclosed in clouds), and all approved submittals. Any dimensions beyond the tolerances of those established by nationally recognized standards for the specific CSI division or section applicable shall be included on the record drawings.

D. Record Drawings shall also include location and size of all concrete patches and cracks.

E. Closeout submittals include, but are not limited to, the following:
   1. Project record documents
   2. Maintenance manuals
   3. Extra stock
   4. Certificate of Inspection
   5. Warranties

F. Evidence of payments and release of liens:
   2. Contractor's Affidavit of Release of Liens: AIA G706A, with:
      a. Consent of Surety to Final Payment: AIA G707
      b. Contractor's release of waivers of lien for subcontractors, suppliers and others with lien rights against property of Owner, together with list of those parties.
1.3 Project Record Documents

A. Maintain at Project site, one copy of:
   1. Contract Drawings (blueline prints)
   2. Project Manual, including agenda
   3. Approved Shop Drawings
   4. Change Orders and Field Change Authorization
   5. Other modifications to Contract
   6. Field test records

B. Store documents in temporary field office apart from documents used for construction. Provide files and racks for storage of documents.

C. Maintain documents in clean, dry, legible conditions; do not use record documents for construction purposes.

D. Make documents available at all times for inspection by Engineer and Owner.

E. Contract Drawings: Legibly mark using a red pencil for all graphic work and red ink for all written work to record actual construction:
   1. Depths of various elements of foundation in relation to first floor level.
   2. Field changes of dimension and detail.
   3. Changes not made by change order and field change authorization.
   4. Details not on original Contract Drawings.

F. Specifications and Addenda: markup each Section to record:
   1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
   2. Change made by change order, field change authorization and notice of clarification.
   3. Other matters not originally specified.

G. Shop Drawings: Maintain as record documents; legibly annotate Shop Drawings to record changes made after approval.

H. At completion of Project, deliver Record Documents to Engineer.

1.4 Warranties and Bonds

A. The act of the Contractor in executing the Agreement for this Work shall be considered as his acceptance of the following guarantee covering the Project:
   1. Any materials, workmanship or equipment furnished as a part of this Project which prove defective or fail to operate properly, within two (2) years, or as otherwise specified in the Contract Documents, of the date of acceptance of the Work required under this (or substantial completion of the) Project (damage by
wear and tear, violence or casualty not the fault of the Contractor excepted), shall be repaired and replaced by the Contractor promptly upon notification from the Owner and without cost to the Owner.

2. This guarantee provision shall apply regardless of whether or not such defective workmanship, materials or equipment are listed in the final punch list. Date of acceptance (or substantial completion) will be established by the Owner and Engineer upon finding all items of this Project substantially complete as to quality of workmanship and materials. Also see Division 7 for additional guarantees.

3. Contractor shall provide warranty commencing on the date of Project acceptance. Completion of various Project phases shall not initiate commencement of warranty in these specific areas. A single Project warranty date, at Project acceptance, will constitute commencement of warranty,

NOTE: Some areas of Project may be open to vehicular traffic and subject to wear (i.e. coatings, sealants) prior to commencement of warranty.

PART 2 - PRODUCTS

2.1 Not used.

PART 3 - EXECUTION

3.1 Not used.

END OF SECTION 01 7700
PART 1 - GENERAL

1.1 Related Documents
   A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

1.2 Work Included
   A. The Work of this Section shall include furnishing all labor, materials, equipment, and supervision to demolish, haul, and dispose of concrete in accordance with the Drawings and as specified herein.
      1. Concrete delaminations to the depth as indicated on the Drawings.

1.3 Related Work
   A. The following Work is related to this Section:
      1. Concrete Repair Section 03 0130
      2. Concrete Reinforcement Section 03 2000
      3. Cast-in-Place Concrete Section 03 3000
      4. Shotcrete Section 03 3713

1.4 Quality Control
   A. After demolition is complete but prior to final cleaning, the cavities and all exposed reinforcement shall be reviewed by the Engineer. The review shall include sounding the exposed concrete to determine completeness of delamination removals, examination of dressed edges to verify depth and vertical edge of cut, and uniformity of excavation to insure compliance with minimum limits specified.
   B. The Engineer shall review all reinforcement exposed within the cavities for corrosion or damage resulting from Contractor's removal operations. Replacement of defective or damaged reinforcement bars shall be performed in accordance with Section 03 2000, Concrete Reinforcement.

1.5 Safety
A. Locate electrical conduits prior to concrete demolition or sawcutting. Contractor shall take all necessary precautions to prevent damage to the conduit. Contractor is solely responsible for training and monitoring his work force concerning the safety procedures that should be employed in the execution of this work. Contractor shall repair, at no cost to the Owner, all damage caused by his work.

B. The concrete slab may have embedded electrical conduit. Contractor shall take all necessary precautions to prevent damage to the conduit. Contractor shall coordinate with Owner to shut off power if repairs are located near conduit.

1.6 Submittals

A. Submit for review and approval prior to beginning Work a copy of the proposed restoration sequencing plan.

B. Submit for record types of equipment proposed for use.

1.7 Basis of payment

A. Demolition cost to be included in repair costs, unless otherwise noted.

PART 2 - PRODUCTS

2.1 Not Used

PART 3 - EXECUTION

3.1 Inspection

A. Examine areas and conditions under which the Work is to occur. Notify the Engineer immediately in writing as required in the General Conditions of any conditions detrimental to the proper and timely completion of this Work.

3.2 General

A. Review with the Owner and Engineer the types of equipment proposed for use.

B. Conduct demolition operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.
C. Protect Owner's property which is to remain including: facades, signs, windows, doors, plantings, parking equipment, electrical and mechanical lines and fixtures.

D. Protect adjoining properties, public thoroughfares, sidewalks and utilities from damage due to this operation.

E. Take adequate precautions and provide protection as required to prevent damage to remaining existing elements of the parking structure and all adjoining building elements, and all vehicles using the facility.

F. At no cost to the Owner, promptly repair damage to adjacent facilities resulting from demolition operations.

G. Clean adjacent facilities of dust, dirt and debris resulting from demolition operations.

H. Authority for performing necessary work on public and private property adjoining Owner's property shall be obtained by the Contractor.

I. Remove all temporary protection and devices when no longer needed and when directed by the Owner.

3.3 Delaminated Concrete Surface Preparation

A. Location and Marking of Work Areas

1. Locate floor slab delaminations by sounding the surface with a hammer or rod, or dragging a chain. The Contractor shall sound all floor slabs. Delaminated areas once located by the Contractor will be further sounded to define their limits. These limits or "boundaries" shall be marked with chalk or paint.

2. Beam, wall, column, and ceiling delaminations shall be located by sounding the appropriate member with a hammer or rod. Cracks, usually horizontal in orientation along beam faces and vertical in orientation near corners of columns, are reliable indicators of delaminated concrete. Delaminated areas once located by the Contractor will be further sounded to define their limits. These limits or "boundaries" shall be marked with chalk or paint.

3. Prior to concrete removal locate reinforcing bars and electrical conduits in the vicinity of the repairs. Take the necessary precautions to prevent damage to reinforcement and electrical conduits.

B. Concrete Removal and Surface Preparation

1. All concrete shall be removed from within the marked boundary to a minimum depth as indicated on the Drawings using 15 to 30 pound chipping hammers equipped with chisel point bits. Larger chipping hammers with a maximum stroke of 4 inches shall not be used without approval from the Engineer. If delaminations exist beyond the minimum removal depth, then chipping shall continue until all unsound and delaminated concrete has been removed from the cavity.
2. Where reinforcing bars are exposed by concrete removal, extra caution shall be exercised to avoid damaging them during removal of additional unsound concrete. The minimum depth of concrete removal around and beyond the perimeter of the bar for the entire exposed length shall be as indicated on the Drawings.

3. If rust is present on reinforcing bars where they enter sound concrete, then additional removal of concrete along the reinforcement is required. Such additional removal shall continue until grey reinforcement is exposed. If rust persists beyond the removal limits, the Engineer shall be advised and will direct further removals.

4. Delaminated, spalled and unsound concrete shall have their marked boundaries sawcut to a depth as indicated on the Drawings. All edges shall be straight and patch areas polygon shaped. A diamond blade saw or grinder with abrasive disk suitable for cutting concrete is acceptable for performing this work. The edge cut at the delamination boundary shall be dressed perpendicular to the member face. It shall also be of uniform depth for the entire length of the cut.

C. Preparation of Concrete Bonding Surface

1. Abrasive blast or high pressure waterblast all exposed concrete surfaces to remove laitance and any foreign material that may impair bonding prior to concrete placement.

D. Cleaning and Securing of Reinforcing

1. Refer to Section 03 2000, Concrete Reinforcement. Existing reinforcing and miscellaneous metals shall be cleaned of rust and laitance to near white metal.

E. Final Preparation

1. Airblasting is required as a final step to remove dust and debris.

3.4 Disposal

A. Remove and properly dispose of concrete and debris from areas exposed to public view on a daily basis.

END OF SECTION 02 4119
SECTION 03 0130 – CONCRETE REPAIR

PART 1 - GENERAL

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

1.2 Work Included
   A. The Work of this Section shall include providing and installing concrete patching materials, as indicated on the Drawings and as herein specified.

1.3 Related Work
   A. Related work specified elsewhere:

   1. Section 02 4119 Selective Demolition
   2. Section 03 1100 Concrete Formwork
   3. Section 03 1500 Concrete Accessories
   4. Section 03 2000 Concrete Reinforcement
   5. Section 03 3000 Cast-In-Place Concrete
   6. Section 07 1800 Traffic Coatings
   7. Section 07 9200 Joint Sealants

1.4 Reference Standards
   A. Comply with the following reference Standards; except where more stringent requirements are indicated on the Drawings or specified herein:

   1. American Concrete Institute (ACI)
      b. ACI 201.2R Guide to Durable Concrete.
      c. ACI 222R Corrosion of Metals in Concrete.
      d. ACI-301 Specifications for Structural Concrete for Buildings.
      e. ACI-302.1R Guide for Concrete Floor and Slab Construction.
      f. ACI 304R Guide for Measuring, Mixing, Transporting and Placing Concrete.
      g. ACI 305R Hot Weather Concreting.
      h. ACI 306R Cold Weather Concreting.
      i. ACI 306.1 Standard Specification for Cold Weather Concreting.
      j. ACI 318 Building Code Requirements for Structural Concrete and Commentary.
1.5 Quality Control

A. The patched areas shall be sounded with a hammer 7 days after placement. Repair all detected hollowness by removing and replacing the patch or affected area at no extra cost to the Owner.

B. If shrinkage cracks appear in the repair material within 72 hours after placement, the repairs shall be considered defective, and shall be removed and replaced at no extra cost to the Owner.

C. Plan drawings shall be maintained locating all repairs performed under this Section. Location and size of patches, overlays, etc. must be located on clean drawings. Separate drawings shall be maintained for each Level and Ceiling plan. These drawings shall be incorporated into record set required per Division 1.

D. The Contractor, or Restoration Subcontractors, shall have not less than two (2) years experience in the field of structural concrete restoration work.

1.6 Environmental Requirements

A. Cold weather concreting: In accordance with ACI 306.1 or as specified herein.

B. Hot weather concreting: In accordance with ACI 305 or as specified herein.

C. Inclement Weather:

1. Unless adequate protection is provided, concrete shall not be placed during rain, sleet or snow.

2. Rain water shall not be allowed to increase the mixing water nor to damage the surface finish.

1.7 Submittals

A. Submit for record the Manufacturer's Spec Data Sheets and Health and Safety Data Sheets.

B. Submit for record upon request, a written description of the Contractor's concrete repair ability, including equipment, facilities, personnel, and a list of similar completed projects.
1.8 Transportation and Handling
   
   A. Store materials on platforms off ground, protected from the elements.
   
   B. Handle and store aggregates in a manner to prevent intrusion of foreign material. Protect all material until used.
   
   C. Material which has deteriorated or which has been damaged shall not be used.

1.9 Basis of Payment
   
   A. All patching quantities shall be measured on a unit cost basis. Refer to Bid Form.
   
   B. Depth of patches are as indicated on the Drawings.
   
   C. Submit copy of drawings identifying current quantities with each payment request. Work being invoiced must be properly identified. These drawings shall be incorporated into record set required per Division 1.

PART 2 - PRODUCTS

2.1 Horizontal Repair Mortar (Corrosion Inhibitor)
   
   A. Repair mortar to be traffic bearing, polymer modified with corrosion inhibitor, cementitious, type and thickness to meet conditions as indicated on the Drawings.
   
   B. For deeper patches add aggregate per Manufacturer’s recommendation.
   
   C. Acceptable repair mortar with corrosion inhibitor for patching horizontal surfaces is:
      
      1. Sikatop 111 Plus or Sikacrete 211 SCC Plus, Sika Corp., Lyndhurst, NJ
      2. MasterEmaco S 466CI or S 477CI, BASF, Shakopee, MN
      3. Eucocrete Supreme, Euclid Chemical Co., Cleveland, OH
      4. Planitiop 15 or FD, Mapei, Deerfield Beach, FL
      5. Meadow-Crete GPS, W.R. Meadows, Inc., Hampshire, IL
      6. Or Approved Equivalent

2.2 Vertical Overhead Repair Mortar (Corrosion Inhibitor)
   
   A. Repair mortar to be polymer modified cementitious, with corrosion inhibitor, type and thickness to meet conditions as indicated on the Drawings.
   
   B. Trowel Applied - Acceptable repair mortar with corrosion inhibitor for patching vertical surfaces is:
1. MasterEmaco S 488Cl, BASF, Shakopee, MN.
2. Sikatop 122 Plus or 123 Plus, Sika Corp., Lyndhurst, NJ.
3. Verticoat Supreme, Euclid Chemical Co., Cleveland, OH
4. Planitop 23, or X, Mapei, Deerfield Beach, FL
5. Meadow-Crete GPS, W.R. Meadows, Inc., Hampshire, IL
6. Or Approved Equivalent

C. Form and Pour - Acceptable repair mortar with corrosion inhibitor for patching vertical surfaces is:

1. MasterEmaco S 466CI or S 477CI, BASF, Shakopee, MN.
2. Sikatop 111 Plus or Sikacrete 211 SCC Plus, Sika Corp., Lyndhurst, NJ
3. Eucocrete Supreme, Euclid Chemical Co., Cleveland, OH
4. Planitop 15 or FD, Mapei, Deerfield Beach, FL
5. Or Approved Equivalent

PART 3 - EXECUTION

3.1 Inspection

A. Before commencing work, examine all adjoining work on which this work is dependent and report in writing to the Engineer any condition which prevents Contractor from performing the work. Starting work constitutes acceptance of adjoining work.

3.2 Surface Preparation

A. Refer to Section 02 4119, Selective Demolition

3.3 Existing Reinforcement

A. Refer to Section 03 2000, Concrete Reinforcement

3.4 Placing Concrete Patching Materials

A. The mixing and installing of the concrete patching materials and the priming of the existing concrete surface shall be in accordance with the Manufacturer's recommendations.

B. Concrete patching materials shall be cured according to the Manufacturer's recommendations.

END OF SECTION 03 0130
SECTION 03 1100 - CONCRETE FORMWORK

PART 1 - GENERAL

1.1 Related Documents
   A. Drawings and general provisions of the Contract, including General and Supplementary
      Conditions and Division 01 Specification Sections, apply to this Section.
   B. The latest editions of ACI 301, “Standard Specification for Structural Concrete” and ACI 117
      Standard Specifications for Tolerances for Concrete Construction and Materials are hereby a
      part of this Section. Specific project requirements or modifications are specified herein.

1.2 Work Included
   A. Work of this Section shall include design, material, delivery, labor, equipment, and supervision
      to install formwork and shoring systems for cast-in-place concrete as indicated on Drawings and
      as specified herein.

1.3 Related Work
   A. Related Work specified elsewhere:
      1. Section 03 0130 Concrete Repair
      2. Section 03 1500 Concrete Accessories
      3. Section 03 2000 Concrete Reinforcement
      4. Section 03 3000 Cast-In-Place Concrete
      5. Section 03 3713 Shotcrete

1.4 Reference Standards
   A. Comply with following reference standards, except where more stringent requirements are
      indicated on Drawings or specified herein:
      1. American Concrete Institute (ACI):
         b. ACI SP-4, Formwork for Concrete, latest edition.
         c. As indicated in Section 03 3000 “Cast-In-Place Concrete”
      2. American Welding Society (AWS):
      3. American Iron and Steel Institute (AISI):
1.5 **Performance and Design Requirements (ACI 301, 2.2.2) Additional requirements:**

A. Formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces, structure, or adjacent materials.

B. Shoring shall be secured against horizontal movement by bracing in both longitudinal and transverse directions. Shoring shall be braced at intermediate levels when more than twelve (12) feet high.

C. Provide shoring so loads from construction above will transfer directly. Space shoring in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members where no reinforcing steel is provided.

1.6 **Quality Control**

A. Formwork materials and installation work may be reviewed by the Engineer at any time during the progress of the Work. Allow free access to facilities for this purpose.

1.7 **Submittals (ACI 301 2.1.2)**

A. For record formwork product data including facing materials.

B. For record formwork release agent product data.

1.8 **Transportation and Handling**

A. Store all formwork materials clear of ground, protected, so as to preclude damage.

1.9 **Basis of Payment**

A. Formwork and shoring are to be included in cost of concrete placement and demolition.

**PART 2 - PRODUCTS**

2.1 **Materials (ACI 301 2.2.1) Additional requirements as follows:**

A. Form-facing materials (ACI 301 2.2.1.1)
1. Formwork for exposed finish concrete to provide smooth form finish.
   a. Unless otherwise indicated, construct with plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system indicated on Drawings. Provide formwork material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.

2. Formwork for unexposed finish concrete to provide rough form finish.
   a. Construct with plywood, lumber, metal, and other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 Formwork Accessories (ACI 301 2.2.1.2) Additional requirements as follows:

   A. Ties exposed to view or exposed to weather:
      1. Ties shall be one of following:
         a. stainless steel AISI 302/304 or
         b. “snap off” type or
         c. removable.
      2. “Snap off” metal ties shall have cones and be designed to break back to allow a minimum 1-1/2 inch cover over ends or portions of ties remaining.
      3. “Snap off” area shall not leave a hole larger than one inch diameter in concrete surface.

   B. Ties used in areas which will not be exposed to view or are below grade shall be commercially manufactured with no minimum requirements regarding stainless steel/snap-off/removability.

2.3 Form Release Agent (ACI 301 2.2.1.3) Additional requirements as follows:

   A. Form release agent shall be non-toxic, VOC compliant, environmentally safe compatible with formwork material and shall not dust, contribute to bug holes nor adversely affect concrete surfaces, and shall not impair subsequent treatment of concrete surface.

2.4 Shores

   A. Shores shall consist of wood or steel posts.

PART 3 - EXECUTION

3.1 Inspection
A. Inspect area to receive Work and report immediately in writing to Engineer, as required in General Conditions, any unacceptable conditions.

3.2 Formwork Fabrication and Manufacture (ACI 301 2.2.3) Additional requirements as follows:

A. Kerf wood inserts for forming keyways, reglets, recesses, etc., to prevent swelling and assure ease of removal.

B. Bevel reentrant corners or edges of formed joints as indicated on Drawings.

3.3 Construction and Erection of Formwork (ACI 301 2.3.1) Additional requirements as follows:

A. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

B. Form joints in all exposed concrete surfaces shall be securely taped or sealed by approved means to prevent leakage and loss of paste during placement of concrete.

C. All wood forms for columns shall be securely tied together with adjustable steel clamps, spaced so as to insure an absolute rigid form in conformance with printed tables of the clamp Manufacturer.

D. Re-tighten forms immediately after concrete placement as required to eliminate mortar leaks.

E. Do not thin form release agent.

F. If steel forms are used, form release agent shall be non-staining rust preventative.

3.4 Tolerances (ACI 301 2.3.1.2) Additional requirements as follows:

A. Construct formwork to provide completed concrete surfaces complying with tolerances specified in ACI 117, Sections 3 and 4.

B. Check lines and levels of completed formwork for all exposed columns, spandrels, etc. before concrete is placed.

C. Make corrections or adjustments to formwork that will be required to correct any deviation which exceeds specified tolerances.

D. Check formwork during concrete placement to ensure that forms, shores, falsework, ties, and other features have not been disturbed by concrete placement methods or equipment.
E. The offset between adjacent formwork facing material shall not exceed ACI 117 Class A 1/8 inch.

3.5 **Installation of Reinforcement**

A. Refer to Section 03 2000, Concrete Reinforcement.

3.6 **Removal of Formwork (ACI 301 2.3.2) Additional requirements as follows:**

A. Formwork removal shall be coordinated with curing requirements as specified in Section 03 3000 Cast-In-Place Concrete.

B. Formwork including shores for structural members ie. piers, columns, walls, beams, and slabs shall remain in place until minimum formwork removal strength is obtained as specified on Drawings.

C. Formwork removal strength will be verified by field-cured test cylinders in accordance with ACI 301 2.3.4.1 or 2.3.4.2.

D. In no case shall formwork and shoring removal from horizontal members be before concrete strength is at least 70 percent of specified design strength or approved by Engineer.

3.7 **Re-Use of Forms**

A. Clean and repair surfaces of forms to be re-used. Remove fins and laitance, and tighten forms to close joints. Align and secure joints to avoid offsets. Split, frayed, delaminated or otherwise damaged form facing material shall not be acceptable for exposed surfaces.

B. Apply new form-release agent as specified.

C. Do not use "patched" forms for exposed concrete surfaces, unless approved by Engineer.

END OF SECTION 03 1100
SECTION 03 1500 - CONCRETE ACCESSORIES

PART 1 - GENERAL

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

1.2 Work Included
   A. Work of this Section shall include all materials, equipment, labor, and supervision to furnish and
      install all concrete accessories as herein specified and as indicated on Drawings, including all
      anchor bolts, inserts, plates, slide bearing systems, angles, sleeves, nailing blocks, joint fillers,
      masonry hardware, or embedded items furnished by Others.

1.3 Related Work
   A. Related work specified elsewhere:
      1. Section 03 0130 Concrete Repair
      2. Section 03 1100 Concrete Formwork
      3. Section 03 2000 Concrete Reinforcement
      4. Section 03 3000 Cast-In-Place Concrete
      5. Section 03 3713 Shotcrete

   B. Reference Standards
      1. Comply with following reference standards, except where more stringent requirements
         are indicated on Drawings or specified herein:
         a. American Concrete Institute (ACI)
            1) Editions as indicated in Section 03 3000, Cast-In-Place Concrete.
         b. American Society for Testing and Materials (ASTM)
            1) As specified herein

1.4 Transportation and Handling
   A. Deliver concrete accessories to site bundled or packaged, tagged and marked indicating
      product, size, Manufacturer and other identifying information.
   B. Store materials at site in such a way to maintain them dry, undamaged and clean.
1.5 Submittals
A. For review and approval concrete accessory Manufacturer's product literature.

1.6 Samples
A. Submit for review and approval upon request samples of concrete accessories.

1.7 Basis of Payment
A. Concrete accessories are incidental to cost of concrete and repair items.

PART 2 - PRODUCTS

2.1 Adhesive Anchors
A. Provide sizes and types as indicated on Drawings.
B. All threaded rods and associated hardware to be Type 303/304 stainless steel.
C. Injection gel to be two-component epoxy ASTM C 881.
D. Stainless steel screens as indicated on Drawings or as recommended by Manufacturer.
E. Installation per Manufacturer’s recommendations.
F. Acceptable materials are:
   1. HY 200, Hilti, Inc.
   2. PE1000+, Powers Fasteners Inc.
   3. Set-XP, Simson Strong-Tie Anchor Systems
   4. or Approved Equivalent.

2.2 Asphaltic Joint Filler
A. Joint filler for slabs on grade adjacent to foundation walls, grade beams, columns and sidewalk joints as indicated on Drawings.
B. Acceptable materials are:
   2. Right-Joint Expansion Joint, Right/Pointe Company
   3. or Approved Equivalent.

2.3 Compressible Joint Filler
A. Compressible joint filler for isolation of slabs, walls, columns as indicated on Drawings.

B. Acceptable materials are:
   1. Ceramar Flexible Foam Expansion Joint, W. R. Meadows
   2. Flex/Foam Expansion Joint, Right/Pointe Company
   3. or Approved Equivalent.

PART 3 - EXECUTION

3.1 Inspection

A. Inspect area to receive Work and report immediately in writing to Engineer, as required in General Conditions, any unacceptable conditions.

3.2 Installation

A. Contractor shall be responsible for proper placing of all embedded pipe, conduit, and other fixtures.

B. Minimum cover requirements for reinforcing shall apply to all embedded items unless indicated otherwise on Drawings.

C. Use suitable templates to accurately set and support bolts, inserts, sleeves, or other embedded items against displacement.

D. Compressible joint filler shall be applied to surfaces as detailed and indicated on Drawings. Adhesive shall be applied in strict accordance with Manufacturer's recommendations. Adequate curing time shall be allowed for adhesive prior to placing concrete against filler surface.

END OF SECTION 03 1500
SECTION 03 2000 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 Related Documents

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

B. ACI 301 Standard Specifications for Structural Concrete and ACI 117 Standard Specifications for Tolerances for Concrete Construction and Materials are hereby a part of this Section. Specific project requirements or modifications are specified herein.

1.2 Work Included

A. Work of this Section shall include materials, fabrication, delivery, and installation of reinforcement for cast-in-place concrete.

B. Field epoxy coating of exposed reinforcement in concrete cavities.

1.3 Related Work

A. Related work specified elsewhere:

1. Section 03 0130 Concrete Repair
2. Section 03 1100 Concrete Formwork
3. Section 03 1500 Concrete Accessories
4. Section 03 3000 Cast-in-Place Concrete
5. Section 03 3713 Shotcrete

1.4 Reference Standards

A. Comply with following reference standards, except where more stringent requirements are indicated on Drawings or specified herein.

1. American Concrete Institute (ACI)
   a. As indicated in Section 03 3000, Cast-In-Place Concrete and as specified herein.

2. American Welding Society (AWS)

   a. Placing Reinforcing Bars
b. Reinforcement Anchorages and Splices
c. Fabrication of Epoxy-Coated Rebar
d. Field Handling Techniques for Epoxy-Coated Rebar at the Job Site
e. Manual of Standard Practice

b. Structural Detailing Manual

a. As specified herein.

1.5 Quality Control

A. Materials and installed Work may be reviewed by Engineer at any time during progress of Work. Allow free access to facilities for this purpose. Provide 48 hours notice to inspect completed reinforcing prior to placement of concrete.

B. If in opinion of Engineer, cross-sectional area loss of bars is greater than 15 percent, Contractor shall splice as directed by Engineer. Minimal splice lap shall be as indicated on Drawings.

1.6 Submittals (ACI 301 3.1.1) Additional requirements as follows:

A. For review and approval, Health and Safety Data Sheets and Manufacturer's Spec Data Sheets for field-applied epoxy coating.

1.7 Transportation and Handling (ACI 301 3.12) Additional requirements as follows:

A. Store reinforcement on supports above ground level. Protect from weather.

B. Epoxy-coated reinforcement

1. Comply with requirements of ASTM D 3963/D 3963M-96 Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars and CRSI Field Handling Techniques for Epoxy-Coated Rebar at the Job Site.

C. If reinforcement is to be stored on site for more than 1 month before placement, cover reinforcement with opaque polyethylene sheeting, properly secured. Do not store reinforcement at job site unprotected over winter.

1.8 Basis of Payment

A. Reinforcement is to be included in cost of concrete placement.
B. Cleaning and coating of existing reinforcement shall be incidental to cost of concrete demolition and replacement.

PART 2 - PRODUCTS

2.1 Materials (ACI 301 3.2.1) Additional requirements as follows:

A. Reinforcement
   1. ASTM A615, grade 60, unless noted.

B. Epoxy-Coated Reinforcement
   1. ASTM A775.

C. Welded Wire Fabric Reinforcement (rolls not accepted)
   1. ASTM A884, epoxy-coated welded wire reinforcement.

D. Wire Reinforcement Supports (ACI 301 3.2.1.8)
   1. Provide CRSI Class 1-A epoxy, vinyl, or plastic-coated bright basic wire bar supports for epoxy reinforcement in contact with formwork, including bolsters, chairs, spacers and other devices for spacing, supporting, and fastening reinforcing bars in place.

E. Tie Wire
   1. Tie wire shall be plastic or vinyl coated for all epoxy coated reinforcement, and post-tensioning tendons.

F. Field-Applied Epoxy Modified Coating
   1. Field-applied epoxy modified coating with Anti-Corrosion Agent (two coats at 10 mils) for existing reinforcement and miscellaneous metals embedded in concrete.
   2. Acceptable field applied epoxy modified coatings are:
      a. Sika Armatec 110 Epo Cem, Sika Corporation.
      b. MasterEmaco P 124, BASF, Shakopee, MN.
      c. Mapei Mapefer 1k, Mapei, Deerfield Beach, FL
      d. Dualprep A.C., Euclid Chemical Company, Cleveland, OH.

PART 3 - EXECUTION

3.1 Inspection
A. Inspect area to receive Work and report immediately in writing to Engineer, as required in General Conditions, any unacceptable conditions.

3.2 Fabrication

A. Fabrication tolerances shall be in accordance with ACI 117.2.1.

3.3 Placement (ACI 301 3.3.2) Additional requirements as follows:

A. Tolerances (ACI 301 3.3.2.1)
   1. Comply with Concrete Reinforcing Steel Institute's recommended practice for Placing Reinforcing Bars, for details and methods of reinforcement placement and supports, and as herein specified.

B. Reinforcement supports (ACI 301 3.3.2.4)
   1. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces so that concrete cover for tie wire matches cover for reinforcement.
   2. Supports for bars shall be placed at 4'-0" maximum spacing. Supports shall be placed a maximum of 6 inches from ends of the reinforcement.

C. Welded wire reinforcement (ACI 301 3.3.2.5)
   1. Install in lengths as long as practical. Offset end laps in adjacent widths to prevent continuous laps in either direction.
   2. Supports for welded wire fabric shall be placed at 2'-0" maximum spacing.

3.4 Epoxy Coating Inspection and Repair

A. Repair is required of all visible damaged areas, if one percent or less of surface area of coating in any three (3) foot length of reinforcement is damaged. If more than one percent of surface area is damaged, reinforcement shall be replaced.

B. Repair damaged epoxy coating as Engineer directs. Repair shall be performed a minimum of 24 hours prior to concrete placement, unless Contractor submits Manufacturer's data indicating lesser curing time.

C. Repair of epoxy coating shall not be carried out when temperature of reinforcement or ambient air is 5 degrees C. or below, or when moisture is present.

D. Inspection and acceptance of epoxy coated reinforcement will be per CRSI Guidelines for Inspection and Acceptance of Epoxy-Coated Reinforcing Bars at the Job site.
3.5 Existing Reinforcement

A. Existing reinforcement and miscellaneous metal to remain shall be cleaned of rust and laitance to Near White Metal and field epoxy coated in accordance with epoxy coating Manufacturer's recommendations.

B. Loose reinforcement bars shall be secured by either tying to bonded reinforcement or drilling supplemental anchors and installing tie downs. Lead anchors are not permitted.

C. Field-applied epoxy cure time must be extended as directed by Engineer during cold weather application.

D. Field-applied epoxy must be properly cured in a non "tacky" condition prior to concrete placement.

E. Remove epoxy spillage from adjacent concrete surfaces.

END OF SECTION 03 2000
SECTION 03 3000 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 Related Documents

A. Conditions of Contract for Construction and General Requirements of Division 1 of these Specifications apply to Work in this Section.

B. ACI 301, Specifications for Structural Concrete and ACI 117 Standard Specifications for Tolerances for Concrete Construction and Materials are hereby a part of this Section. Specific project requirements or modifications are specified herein.

1.2 Work Included

A. Work in this Section shall include all equipment, materials, labor, and supervision to install cast-in-place concrete as indicated on Drawings and as specified herein.

B. Remove and reinstall all electrical conduit, mechanical conductors, light fixtures, mechanical equipment, signs, etc. necessary for proper completion of repairs.

C. Concrete repair materials.

1.3 Related Work

A. Work related to this Section:
   1. Concrete Repair Section 03 0130
   2. Concrete Formwork Section 03 1100
   3. Concrete Accessories Section 03 1500
   4. Concrete Reinforcement Section 03 2000
   5. Shotcrete Section 03 3713
   6. Traffic Coatings Section 07 1800
   7. Joint Sealants Section 07 9200

1.4 Reference Standards and Cited Publication. (ACI 301 1.3) Additional standards as follows:

A. American Concrete Institute (ACI)
   1. ACI 201.2R Guide to Durable Concrete.
   2. ACI 222R Corrosion of Metals in Concrete.
   3. ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
   4. ACI 212.4R Guide for the Use of High-Range Water Reducing Admixtures (Superplasticizers) in Concrete.
   5. ACI 221.R State-of-the-Art Report on Alkali – Aggregate Reactivity
6. ACI-302.1R Guide for Concrete Floor and Slab Construction.
8. ACI 305R Hot Weather Concreting.
10. ACI 308 Standard Practice for Curing Concrete.
11. ACI 311.5R Guide for Concrete Plant Inspection and Field Testing of Ready-Mixed Concrete.
12. ACI-318 Building Code Requirements for Structural Concrete.
14. ACI 515.1R Guide to the Use of Waterproofing, Dampproofing, Protective and Decorative Barrier Systems for Concrete.
15. ACI SP 66 Detailing Manual.
16. ACI Concrete Craftsman Series.
17. ACI CP-10 Craftsman Workbook for ACI Certification of Concrete Flatwork Technician Finisher.

B. Federal Highway Administration
1. FHWA-RD-77-85, Sampling and Testing for Chloride Ion in Concrete.

C. American Association of State Highway Transportation Officials (AASHTO)
1. AASHTO T 260, Method of Sampling and Testing for Total Chloride Ion in Concrete and Concrete Raw Materials.
2. AASHTO T 318, Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying.

D. American Society of Testing Materials (ASTM)
1. As specified herein.

1.5 Quality Assurance (ACI 301 1.6) Additional requirements as follows:

A. General (ACI 301 1.6.1)
1. Perform all Work in strict accordance with laws and regulations of applicable Building Codes and with all other authorities having jurisdiction, that take precedence over requirements of this Specification, except where requirements of Specifications are more exacting or stringent, they shall govern.

B. Testing responsibilities of Contractor (ACI 301 1.6.3).
1. Provide Owner's Testing Laboratory, for their review, proposed mix designs, including samples for tests of:
   a. Air content.
   b. Chloride permeability.
   c. Plastic and hardened concrete corrosion inhibitors.
2. Advise Owner's Testing Laboratory minimum of 48 hours in advance of operations.
3. Report any testing irregularities to Engineer.
4. Patch holes resulting from concrete coring, matching adjacent areas.
5. Concrete mix designs shall also be reviewed and approved by the admixture Manufacturer.
6. If, at any time during construction, it is desired to deviate from approved mix designs, Contractor's Testing Laboratory shall modify mix design, subject to Engineer's approval.
C. Admixture Manufacturer shall make available a qualified Manufacturer's Representative to assist Contractor and Engineer as specified in this Section.

D. Corrosion Inhibitor Dispensing Requirements:
   1. Ready-Mix Supplier shall have corrosion inhibitor Manufacturer's Representative perform following:
      a. Install visual reference (such as bottle or other approved device) for dispensing Calcium Nitrite corrosion inhibitor. Visual reference shall be accessible to Owner's Testing Laboratory, Manufacturer's Representative, and Engineer.
      b. Calibrate dispensing system at initial equipment installation and annually thereafter. Install tamperproof seals after each calibration of system.
   2. Ready-Mix Supplier shall perform following:
      a. Verify contents of visual reference prior to discharge of product for each batch. If visual reference does not indicate specified amount of corrosion inhibitor, Ready-Mix Supplier shall stop production and notify corrosion inhibitor Manufacturer/Supplier immediately.
   1. Owner's Testing Laboratory (Ready-Mixed Supplier) shall perform following:
      a. Prior to and after each pour, take volume readings of corrosion inhibitor tank, correlate to size of pour, and report results to Engineer, Manufacturer/Supplier, and Ready-Mix Supplier. Volume used shall be within +/- 10% of specified amount.

E. Admixtures shall be from single manufacturer, where possible. A letter shall be issued from several manufacturers certifying compatibility with all ingredients in the proposed mix design.

F. A minimum of one concrete finishing crew member shall be an ACI Certified Concrete Flatwork Finisher or equivalent for all slabs on grade and supported slabs. Equivalent finisher certification programs shall include both written and performance examinations. Certified finisher shall have input to crew's placement and finishing procedures regarding application of ACI Standards for quality flatwork. Contractor shall designate a certified finisher in advance of operations and warrant continued participation. Applicable standards are contained in ACI "Concrete Craftsman Series."

G. Nondestructive tests will not be permitted to determine in-place strength.

H. Contractor, or Restoration Subcontractors, shall have not less than two (2) years experience in the field of structural concrete restoration work.

I. Repaired areas shall be sounded by Contractor with a chain drag or hammer seven (7) days after concrete placement. Contractor shall repair all hollowness detected by removing and replacing patch or affected area at no extra cost to Owner.

J. Maintain plan drawing locating all concrete repairs performed under this Section. Location and size of patches, overlays, etc. must be located on clean drawing. Separate drawing shall be maintained for each Level and ceiling plan.
1.6 **Submittals (ACI 301 Submittals Checklist) Additional Submittal requirements as follows:**

A. For review and approval mix designs on each class of concrete a minimum of three (3) weeks prior to placing concrete. Mix designs shall be prepared in accordance with ACI 301. Proportions shall be in accordance with ACI 211.1. Use attached "Concrete Mix Design Submittal Form" at end of this Section and also provide all material data identified in "Required Attachments" for the concrete mix design submittal.

B. All submitted material data shall be representative of concrete to be supplied and shall be current to the Work (i.e. tested within past 3 months of award date of contract).

C. For review and approval a warrant of design mix(s), stating that they are totally representative of concrete(s) to be supplied and that they meet requirements of Contract Documents.

D. For review and approval new design mixes when any change in materials are required or necessary.

E. For record upon request concrete delivery tickets.

F. For review and approval all materials and methods for concrete curing.

G. For review and approval upon request cold weather placement procedures.

H. For review and approval upon request wet weather protection procedures.

I. For review and approval upon request hot weather placement procedures.

J. For review and approval prior to making structural repairs to concrete, patching materials to be used and method of application.

K. For record upon request, a written description of Contractor's concrete repair ability, including equipment, facilities, personnel, and a list of similar completed projects.

L. For review and approval upon request of bonding grout mix design.

1.7 **Materials Storage and Handling (ACI 301 4.1.4) Additional requirements as follows:**

A. Store materials on platforms off ground; protect stored cement against elements. Handle and store aggregates separately in a manner to prevent intrusion of foreign material. Protect all material until used. Any materials which have deteriorated or have been damaged shall not be used.

1.8 **Basis of Payment**

A. All patching quantities shall be measured on a square foot basis; estimated depth of patch as indicated on Drawings.
B. Submit copy of drawings identifying current quantities with each payment request. Work being invoiced must be properly identified. These drawings shall be incorporated into record set required per Division 1.

PART 2 - PRODUCTS

2.1 Products (ACI 301 4.2) Additional requirements as follows:

A. Cementitious Material (ACI 301 4.2.1.1)

B. Aggregates (ACI 301 4.2.1.2)
1. Aggregates shall have a total water soluble chloride ion content below 0.02 percent by weight of aggregate, unless a higher limit is approved by Engineer by adding corrosion inhibitor to mixture to offset additional chloride ion.
2. Coarse aggregate shall consist of gravel, crushed gravel, crushed stone, or other approved inert materials of similar characteristics, meeting ASTM C 33 class designation as follows:
   a. Columns, beams, slabs, walls, and all other members: Class 5S.
3. Acceptance of aggregate for freeze thaw characteristics shall be based on past performance in concrete under similar conditions (freeze thaw, road salts) over five winters or when concrete is tested in accordance with ASTM Standard C 666.
4. Acceptance of aggregate for shrinkage characteristics shall be based on its past performance in concrete under similar conditions, or when concrete is tested in accordance with ASTM C 157 and ASTM C 469.
5. Acceptance of aggregate for alkali-aggregate reactivity (AAR) or Alkali-carbonate reactivity (ACR) shall be based on past performance in concrete under similar conditions, or when the aggregates are examined by petrographic examination ASTM C 295, and/or rock cylinder test ASTM C 586, and/or prism test ASTM C 1105 and/or tested in accordance with one or more of ASTM Standards C 1260, C 1293 or C 1567.

C. Admixtures (ACI 301 4.2.1.4)
1. Admixtures shall be used to provide proper workability, finishability, and setting times at low water-cementitious ratios and to increase compressive strength, of concrete as approved by Engineer.
2. Use approved admixtures and dosage rates as necessary unless indicated otherwise on Drawings. Use in strict accordance with Manufacturer’s recommendations. Admixtures shall be added at separate intervals or locations of mix cycle.
3. Air entraining admixtures: specific admixture to be selected by Admixture Representative and approved by Engineer.
   a. ASTM C 260
   b. Acceptable materials are:
      1) Sika AIR Series, AEA-14 or AEA-15, Sika Corp.
      2) Darex or Daravair Series, W.R. Grace & Co.
      3) MB or Micro-Air Series, BASF Admixtures
      4) AEA, Air Mix or Eucon Air Series, Euclid Chemical Company
      5) Catexol Series, Axim Italcementi Group
      6) or Approved Equivalent.
4. Chemical Admixtures: specific admixture to be selected by Admixture Representative and approved by Engineer.
   a. Water reducing admixtures
      1) ASTM C 494, Type A
      2) Acceptable materials are:
         a) Plastocrete, Sika Corp.
         b) WRDA or ADVA Series, W.R. Grace & Co.
         c) Pozzolith Series, BASF Admixtures
         d) Eucon Series, Euclid Chemical Company
         e) Catexol Series, Axim Italcementi Group
         f) or Approved Equivalent.
   b. Midrange water reducing admixture conventional slump concrete 6" – 8".
      1) ASTM C 494, Type A.
      2) Use shall not change the requirement of:
         a) Water/cementitious ratio
         b) Concrete strength
         c) Air content
         d) Specification for placing, finishing, and curing
      c. Acceptable materials are:
         1) Sikament AFM or Sikament 686, (Sikament Series), Sika Corp.
         2) Daracem, MIRA, or ADVA Series, W.R. Grace & Co.
         3) Polyheed Series, BASF Admixtures
         4) Eucon Series, Euclid Chemical Co.
         5) Catexol Series, Axim Italcementi Group
   d. High range water reducing admixture 6" – 10" slump concrete.
      1) ASTM C 494, Type F or G
      2) Use shall not change requirement of:
         a) Water/cementitious ratio
         b) Concrete strength
         c) Air content
         d) Specification for placing, finishing, and curing
      3) Acceptable materials are:
         a) Sikament AFM or Sikament 686, (Visocrete Series), Sika Corp.
         b) ADVA or Daracem Series, W.R. Grace & Co.
         c) Glenium Series or Rheobuild 1000 or 716, BASF Admixtures
         d) Eucon or Plastol Series, Euclid Chemical Company.
         e) Catexol Series, Axim Italcementi Group
   e. High range water reducing admixture (superplasticizer): self-consolidating concrete.
      1) ASTM C 1017 Type I or II
      2) Use shall not change requirements of:
         a) Concrete strength
         b) Air content
         c) Specification for placing, finishing and curing
      3) Acceptable materials
         a) Sikament 300 or 686, (Visocrete Series), Sika Corp.
         b) ADVA or Daracem Series, W.R. Grace & Co.
         c) Glenium Series, BASF Admixtures
         d) Plastol Series, Euclid Chemical Company.
         e) Catexol Series, Axim Italcementi Group
f) or Approved Equivalent.
f. Non-corrosive non-chloride accelerator:
   1) ASTM C 494, Type C or E
   2) Admixture shall not contain more chloride ions than are present in municipal
drinking water. Admixture Manufacturer must have long-term non-corrosive
test data from an independent testing laboratory (of at least a year’s
duration) using an acceptable accelerated corrosion test method such as
that using electrical potential measures.
   3) Acceptable materials are:
      a) Plastocrete 161 FL or Sikaset NC, (SikaSet Series), Sika Corp.
      b) Daraset Series, Lubricon NCA, DCI, or Polarset, W.R. Grace & Co.
      c) Pozzutec Series, BASF Admixtures
      d) Accelguard Series, Euclid Chemical Co.
      e) Catexol 2000RHE, Axim Italcementi Group

g. Calcium Nitrite-Based Corrosion Inhibitor
   1) ASTM C 494 Type C
   2) Acceptable materials are:
      a) Sika CNI, Sika Corp.
      b) DCI or DCI-S Corrosion Inhibitor, W.R. Grace & Co.
      c) Rheocrete CNI, BASF Admixtures
      d) Catexol 1000 CN-CI, Axim Italcementi Group
      e) Eucon CIA, Euclid Chemical Company

D. Mineral Admixtures
   1. Fly ash:
      a. Fly ash, if used, shall not exceed 25 percent by weight of total cementitious
         material weight in mix design. Fly ash shall conform to ASTM C 618, including
         optional requirements on available alkalis, Class C or F, sampling and testing per
         ASTM C 311. Loss of ignition (carbon content) shall be limited to 4 percent.
      b. Use of fly ash shall not alter specified levels of air entrainment nor reduce strength
         requirements for any mix.

   2. Silica Fume:
      a. Silica fume shall conform to ASTM C 1240 requirements as a liquid slurry or dry
densified.
      b. Acceptable materials are:
         1) Sikacrete 950 DP, Sika Corp.
         2) Force 10,000 or Force 10,000-D, W. R. Grace & Co.
         3) Rheomac SF100, BASF Admixtures
         4) Eucon MSA, Euclid Chemical Company
         5) Catexol SF-D, Axim Italcementi Group
         6) or Approved Equivalent.
      c. Self disintegrating bags designed to be disposable in batch are prohibited.

E. Ground Granulated Blast-Furnace Slag (GGBS):
   1. Ground Granulated Blast-Furnace Slag, if used, shall not exceed 40 percent by weight of
total cementitious material in mix design.
   2. Ground Granulated Blast-Furnace Slag shall conform to ASTM C 989, Grade 100 or
      higher.

F. Maximum percent of Total Cementitious Materials:
1. Where both flyash and slag are used in a mix design their total shall not exceed 35 percent by weight of the total cementitious material in the mix design for slabs and 50% for formed members.

2. Where flyash, slab and silica fume are all used a single mix design total shall not exceed 42 percent by weight of the total cementitious material in the mix design.

G. Macro Synthetic Fibers – Post Crack Control for concrete members and floor systems.

H. Fibrous Concrete Reinforcement – Plastic Crack Control
   1. 100% virgin polypropylene (Collated fibrillated monofilament materials): Dosage rate 1.5#/cu. yard of concrete minimum, containing at least 3 million individual fibers.
   2. 100% virgin polypropylene (Fibrillated microfilament materials): Dosage rate 1.0#/cu. yard of concrete minimum, containing at least 25 million individual fibers. Minimum length shall be 0.75 in.
   3. Meet minimum plastic shrinkage crack reduction of 70% when tested in accordance with ICBO ES, Appendix B(7-92)
   5. Acceptable materials are:
      b. Fibermesh InForce e3 or Stealth e3, FibreMesh Co., Chattanooga, TN
      c. Forta Fiber-CFP, Forta Corp., Grove City, PA
      d. Axim Fibrasol F, Axim Concrete Technologies
      e. Fiberstrand, The Euclid Chemical Company
      f. Sika Fiber, Sika Corp.
      g. or Approved Equivalent.

2.2 Performance and Design Requirements (ACI 301 4.2.2) Additional requirements are as follows:

A. Coarse Aggregate: - (ACI 301 4.2.2.3)
   1. Maximum aggregate size and ASTM C 33 gradation requirements (4.2.2.3):
      a. All members 3/4 inch, size 67.

B. Air content – (ACI 301 4.2.2.4)
   1. As specified on Drawings.
   2. Plastic air test shall be performed by pressure method, ASTM C 231 or volumetric method, ASTM C 173. Verify air content with unit weight test.

C. Admixtures – (ACI 301 4.2.2.5)
   1. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions by weight of cement are not permitted. No admixture shall cause an increase in shrinkage when tested in accordance with ASTM C 157.

D. Chloride-ion Concentration – (ACI 301 4.2.2.6)
   1. Total soluble chloride-ion content by weight of cement and of concrete shall be provided (for prestressed concrete, floor topping on precast). Total soluble chloride ion content of concrete shall be tested in accordance with AASHTO Method T260 for each proposed mix design. Percent by weight of cement of total soluble chloride ion content shall be
below limits specified on Drawings. This includes contributions from all ingredients. Alternately, water soluble chloride ion content shall be tested in accordance with ASTM C 1218. Percent by weight of cement of water soluble chloride ion content shall be below limits specified on Drawings. This includes contributions from all ingredients. If specified limits are exceeded, additional testing for water soluble chloride ion content shall be performed using Soxhlet method in accordance with ACI 222.1. In event that any concrete mix has water soluble chloride ion content in excess of specified limits for that mix, appropriate amounts of calcium nitrite shall be added to offset its effects. Ready-Mix Supplier shall provide laboratory test results indicating amount of excess chloride ion content in concrete mixture contributed by aggregates. For each pound of chloride ion in excess of amount allowed, mix shall contain calcium nitrite (30% +/- 2%, solids content) on a one-to-one basis (one gallon of calcium nitrite for one pound of excess chloride ion). Maximum of 1.5 lbs. of chloride ion per cubic yard may be offset in this manner.

a. Water soluble chloride ion content of mix including all constituents shall not exceed limits as indicated on Drawings, unless a higher limit is approved by Engineer and corrosion are inhibitors added to mixture to offset additional chloride.

b. If specified level of water soluble chloride ion content cannot be maintained, appropriate level of calcium nitrite admixture shall be added to mix in accordance with above at no additional cost to Owner.

E. Mix Designs with Silica Fume
1. Additional Mix Design Requirements:
   a. Ready-Mix Supplier and Owner Testing Laboratory shall independently perform air content tests of silica fume mix design in accordance with ASTM C 231 or ASTM C 173. Verify air content with unit weight test.

F. Mix Designs with Corrosion Inhibitor
1. Additional Mix Design Requirements
   a. Ready-Mix Supplier and Owner’s Testing Laboratory shall independently perform air content testing of mix design in accordance with ASTM C 231 or ASTM C 173.
   b. Corrosion inhibitor Supplier and Owner’s Testing Laboratory shall independently perform plastic concrete corrosion inhibitor testing of mix design in accordance with test method for Calcium Nitrite Presence in Plastic Concrete indicated in Appendix A of Specification Section 01 410.

G. Strength and Water-Cementitious material ratio – ACI 301 4.2.2.9
1. As scheduled on Drawings.
2. Weight of fly ash, silica fume and GGBS additives shall be included with weight of cement to determine water-cementitious materials ratio.

2.3 Measuring, Batching, and Mixing (ACI 301 4.3.1) Additional requirements as follows:

A. Ready Mix Concrete
1. Furnish delivery ticket with each load of concrete delivered. In addition to requirements of ASTM C 94 Section 16, provide following information on delivery tickets:
   a. Type of aggregate
   b. Total water content
   c. Air Entrainment
   d. Slump
e. Silica fume (if used) admixture content per cubic yard of concrete
f. Fly ash (if used) content per cubic yard of concrete
g. GGBS (if used) content per cubic yard of concrete
h. Water-cementitious materials ratio
i. Corrosion inhibitor
j. High Range Water reducing admixture
k. Fibrous concrete reinforcement

B. Slump adjustment (ACI 301 4.3.2.1).
1. ASTM C 143. Contractor will provide slump guidelines adhering to strength and water/cementitious ratio requirements. Mix design shall provide water slump for concrete and after addition of superplasticizers.
2. Water is not to be added at site to meet specified slump, unless specifically indicated as being withheld on concrete batch ticket and approved by Engineer.
3. High range water reducing admixtures (superplasticizers), if added at batch plant, may be redosed at job site. Manufacturers should provide a redosage chart for this purpose. If superplasticizers are added at batch plant, concrete delivery time, placement, and finishing procedures shall account for limited time affect. If superplasticizer is added at site after verification of initial slump, concrete shall be completely retested after proper mixing. All concrete containing superplasticizer shall have a maximum nine (9) inch slump unless otherwise approved by Engineer.

C. Time of Discharge (ACI 301 4.3.2.2)
1. All concrete trucks shall not have concrete build-up on drum or have worn fins. Engineer may require inspections to verify conformance to NRMCA Quality Control Manual, Section 3.
2. Time of discharge after batching shall not exceed 90 minutes or after drum has revolved 300 revolutions unless otherwise approved by Engineer.

D. Air content tests shall be taken of concrete at point of discharge unless otherwise approved by Engineer.

E. Silica Fume Concrete - Additional Mixing Requirements
1. Sequence and method of charging mixer, transportation, discharging and placement of silica fume concrete shall be reviewed with silica fume Manufacturer’s Representative.
2. For all types of mixing equipment, mix times shall be increased by 40% over minimum mix time required to achieve mix uniformity as defined by ASTM C 94.
3. For truck-mixed and central mixed silica fume concrete, maximum allowable batch size shall be 80% of maximum as called out by ASTM C 94.

F. Fibrous Concrete Reinforcement - Additional mixing requirements
1. Fibers shall be added at a maximum rate of 4 lbs per cubic yard of concrete as indicated on Drawings, Specification, or as approved by Engineer in accordance with Manufacturer’s recommendations and within time and location of initial concrete batching as specified in ASTM C 94.

G. Prepackaged Materials Used in Concrete (ACI 301 4.3.1.3)
1. Mixing and installing of concrete patching materials and priming of existing concrete surface shall be in accordance with Manufacturer’s recommendations.
2. Site mixing operation shall be approved by Manufacturer and produce sufficient concrete so that placement and finishing operation can proceed at a steady pace.

PART 3 - EXECUTION

3.1 General (ACI 301 5.1) Additional requirements as follows:

A. Placement notification (ACI 301 5.1.2.2.b) notify Owner's Testing Laboratory and Engineer 48 hours in advance of concrete operations.

B. Before placement of concrete, formwork shall have been completed, foreign material shall have been removed, reinforcement shall have been secured in place, and entire preparation shall have been reviewed by Engineer.

3.2 Materials (ACI 301 5.2.1) Additional requirements as follows:

A. Curing compounds
   1. Curing Compounds (ACI 301 5.2.1.1)
      a. Acceptable only for use on vertical and overhead repairs.
      b. Curing and Sealing Compound (A.I.M. Regulations – VOC Compliant, 700 g/l):
         Liquid type membrane-forming curing compound, clear styrene acrylate type, complying with ASTM C 1315, Type I, Class B, 25% solids content minimum.
         1) Moisture loss shall be not more than 0.30 Kg/m² when applied at 300 square feet/gallon.
         2) Application rate per ASTM C 1315.
         3) Manufacturer's certification is required.
         4) Acceptable materials are:
            a) "Super Diamond Clear or Super Diamond Clear AC" by The Euclid Chemical Company
            b) "Masterseal 30" by BASF
            c) "Kure N Seal 30" by Sonneborn

B. Waterproof Sheet Materials – (ACI 301 5.2.1.2)
   1. Acceptable materials are:
      a. Waterproof paper over burlap.
      b. White polyethylene film over burlap.
      c. White polyethylene-coated burlap.

C. Evaporation Retarder
   1. Acceptable materials are:
      a. Sika Film, Sika Corporation
      b. Confilm, BASF Ad mixtures
      c. Eucobar, Euclid Chemical Company
      d. E-Con, L & M Construction Chemicals, Inc.
      e. or Approved Equivalent.

D. Grout
1. Non-precision, non-shrink, non-stain, non-metall ic grout in strict accordance with Manufacturer's recommendations.
   a. ASTM C 1107 strength as noted on Drawings.
   b. Color of cured grout used on cast-in-place[ and precast concrete] shall match color of surrounding concrete. Note silica fume concrete surfaces will be darker than conventional concrete.
   c. Note: If products are unable to provide color match, then alternate products will be subject to the approval of the Engineer.
2. Acceptable materials are:
   a. Sika Grout 212, Sika Corp.
   b. Construction Grout, BASF Building Systems
   c. NS Grout, Euclid Chemical Company
   d. Duragrout, L & M Construction Chemicals, Inc.
   e. or Approved Equivalent.
3. When high fluidity precision grout and/or increased placing time is required, use high flow grout. Acceptable materials are:
   a. Sika Group 328, Sika Corporation
   b. Masterflow 928, BASF Building Systems
   c. Hi-Flow Grout, Euclid Chemical Company
   d. or Approved Equivalent.

3.3 Preparation (ACI 301 5.3.1) Additional requirements as follows:

A. Before placement of repair material pre-dampen surfaces of cavities. Surfaces shall have no standing water during the concrete pour.

B. Coordinate Work with other trades to allow reasonable time to set sleeves, inserts and other accessories.

C. Conveying Equipment (ACI 301 5.3.2.3)
   1. Pump hoses shall be supported independently and not laid on reinforcement.

D. Consolidating (ACI 301 5.3.2.5)
   1. Vibrators must not be allowed to touch reinforcement embedded in partially set concrete. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

E. Bonding Grout
   1. All concrete bonding surfaces must be abrasive blasted to a clean sound substrate prior to concrete placement.
   2. Bonding grout shall be pneumatically (brush) applied to existing concrete bonding surface immediately prior to concrete placement. Bonding grout shall be applied evenly to a uniform minimum thickness of 1/16 inch to 1/8 inch throughout. Grout shall not be allowed to dry or dust prior to placement of repair material.
3. Provide one (1) shop vacuum capable of removing water from repair cavity prior to bonding grout application.

F. If construction joints are permitted, new concrete placement shall not be until contact surface of concrete in place has been swept with a stiff brush or scraped to remove laitance and roughened. One hour prior to concrete placement, pre-wet bonding surface or soil with a uniform spray application of water. Surface shall be maintained in a damp condition, puddles shall be blown clean. Bonding surface shall then be coated with a thin layer of bonding grout immediately prior to placement of concrete. Bonding grout shall be worked into bonding surfaces with stiff brooms or brushes.

3.4 Placement of Concrete (ACI 301 5.3.2) Additional requirements as follows:

A. Cold Weather (ACI 306.1, ACI 301 5.3.2.1.b)
1. Record air temperature no less than twice per 24 hour period.
2. Cast expendable thermostats or thermo-couplers in concrete at rate of at least one per 100 cubic yards of concrete placed for supported structure. Monitor internal temperature of concrete at twelve hour maximum intervals throughout curing process.
3. Record temperature of concrete for each batch as delivered.
4. Mix water, sand, and aggregate may be warmed so that no frozen lumps of ice, snow, or aggregate will survive mixing but do not overheat ingredient to cause flash setting of concrete or loss of entrained air.
5. Specified non-corrosive accelerator may be used.
6. Do not place concrete unless air temperature is at least 20 degrees F and rising.
7. Use evaporation retarder or water fog after finishing to assure that plastic shrinkage cracking of concrete surface does not occur.
8. Cure shall consist of visqueen and insulated blankets placed on slab as soon as possible after concrete will support them without deformation.
9. Do not wet cure concrete placed under cold weather conditions.
10. Curing of supported slabs (continuous presence of visqueen and blankets) shall be maintained no less than 10 days.

B. Hot Weather (ACI 305, ACI 301 5.3.2.1.c)
1. Temperature of concrete as delivered shall not exceed 90ºF, unless approved by Engineer.
2. Forms, reinforcing, and air shall be cooled by water fog spraying immediately before placing concrete.
3. Protect flatwork during finishing operations as follows:
   a. Immediately following screeding, apply an evaporator retarding agent in accordance with recommendations of Manufacturer. Additional applications of evaporation retarding agent may be required.
   b. Continuous fog spray of air above slab between finishing operations.
   c. Cover concrete with an approved moisture-retaining cover as soon as concrete will support it without deformation. Keep mats constantly wet for 7 days minimum. Leave mats in place for 3 additional days after discontinuing wetting process.

C. Wet Weather (ACI 301 5.3.2.1a).

D. Grout used to prime concrete pump and pump line shall not be placed into Work.
E. During periods of setting, no materials shall be placed and no loads imposed in any manner on slabs. Plank runways for accommodation of workmen or for other traffic shall be supported by blocking.

F. Construction Joints and Other Bonded Joints (ACI 301 5.3.2.6)
1. Construction of control and isolation joints shall be as located and detailed on Drawings.
2. Coordinate configuration of tooled joints with joint sealant Manufacturer. Refer to Section 07 9200, Joint Sealants.
3. Tool slab joints at time of finishing. Saw cutting is not allowed.
4. Maximum variation between slab surfaces at joints shall not exceed 1/16 inch.
5. Concrete patches shall be edged to match existing condition (beam and column chamfers, etc.), unless noted.
6. Bulkheads to limit each pour to predetermined construction joints, shall be set normal and vertical to section to be poured, and shall be left in place until concrete has sufficiently set. Care shall be used when removing bulkheads to prevent spalling of concrete surface. Any concrete passing through bulkhead shall be removed before adjacent pour is made.
7. Construction or control joints passing through patches shall be tooled through patch for continuity.

3.5 Finishing Formed Surfaces (ACI 301 5.3.3) Additional requirements as follows:
A. Rough – form finish (ACI 301 5.3.3.3.a)
1. All concealed concrete (i.e. behind masonry, below grade, abutting another structure), may have a "rough form finish."

B. Smooth – formed finish (ACI 5.3.3.3.b)
1. All concrete surfaces exposed to public view, both inside and outside structure shall have a "smooth form finish."

3.6 Finishing Unformed Surfaces (ACI 301 5.3.4) Additional requirements as follows:
A. General
1. Spraying of water directly on concrete surfaces is NOT allowed.
2. Use rigid screed rails, wet screeding not accepted.

B. Float Finish (ACI 5.3.4.2.b):
1. Flat work in parking and drive areas.
   a. Begin bull floating immediately after screeding of concrete.
   b. When bleed water has left surface, begin final “float finish” operation.

C. Broom or Belt Finish (ACI 301 5.3.4.2.d)
1. Slab areas to receive a deck coating shall have a “light broom finish,” or as recommended and approved by coating Manufacturer and Engineer. Slab areas not receiving a deck coating shall have a medium broom finish. Ridges shall not exceed 1/8 inch in height. Engineer shall be notified to observe and approve final finish texture.
2. Provide “light broom finish” at stair treads, and a "light broom finish" for stair landings. Texture shall be approved by Engineer.
3. No refloating or finishing is required after brooming.
D. Measuring Tolerances for Slabs (ACI 301 5.3)
   1. Parking and drive areas finishing tolerance - During “float finish” operation planeness of surface shall be checked per ACI 117 4.5.7 Classification Straightedged. All high spots shall be cut down and all low spots filled during finish operation.
   2. Stair Towers - Finishing tolerance - During finishing operation, planeness of surface shall be checked per ACI 117 4.5.7, Classification Straightedged.
   3. Finish all concrete slabs to proper elevations to insure that all surface moisture will drain freely to floor drains that no puddle areas exist. Provide positive drainage and maintain headroom clearances as indicated on Drawings. Notify Engineer of grades or clearances which do not allow headroom so adjustments can be made. Contractor shall bear cost of any corrections to provide for positive drainage.

E. Additional Finishing Requirements as follows:
   1. Finish concrete using procedures to preclude plastic and drying shrinkage cracking. Note the use of low water/cementitious ratio concrete and silica fume and GGBS will essentially eliminate bleed water.
   2. Fog misting air above flat work is recommended. Free standing water is not allowed. No spraying of water directly on flat work will be allowed.
   3. Fog misting is not to be used to apply water to surface of concrete to facilitate lubrication for finishing purposes.
   4. Fog misting is required when conditions of hot weather concrete exist per “Hot Weather Concreting” as specified herein. Fogging shall continue after finishing operation until moisture retaining cover is placed over concrete.
   5. Finish concrete to texture matching approved sample or as required by the deck coating manufacturer.

3.7 Curing and Protection (ACI 301 5.3.6) Additional requirements as follows:

A. General
   1. Curing shall maintain moisture content and temperature to insure strength gain and prevent undesirable cracking, dusting, scaling and crazing.
   2. Cure slab-on-grade, supported concrete slabs, concrete topping on precast as follows: Cover concrete with an approved moisture retaining cover as soon as the concrete will support it without deformation. Keep mats constantly wet for 7 days minimum. Leave mats in place for 3 additional days after discontinuing wetting process.
   3. Additional precautions may need to be taken to prevent excessive slab moisture loss resulting in plastic shrinkage when any combination of air temperature, concrete temperature, relative humidity and/or wind velocity which causes a rate of evaporation in excess of 0.2 pounds per square feet per hour as determined by ACI 308, Figure 1.

B. Unformed concrete surfaces: (ACI 301 5.3.6.2)
   1. Curing of slab-on-grade may be with curing compound in lieu of moist curing and shall be applied in accordance with ACI 301, 5.3.6.4.e with a minimum of two (2) applications.
   2. Curing of supported slabs shall be as ACI 301 5.3.6.4.d, “Application of sheet materials conforming to ASTM C 171. Application of curing compounds is not allowed.
   3. For silica fume concrete mixes, curing procedures shall also be in accordance with requirements of silica fume admixture Manufacturer.
4. As a minimum or as recommended by Manufacturer, surfaces of concrete patches shall be protected with a moisture retaining cover, wet burlap as soon as surface will support it without deformation. Maintain burlap in a continuous saturated condition for three days.

5. During curing period repairs shall be protected from traffic. Slab demolition from above or below shall be halted.

6. Prior to reopening repairs to traffic and loading, confirm that the repair concrete has attained a minimum compressive strength of 70 percent of specified 28 day strength. Confirmation is to be made by field cylinder, cured adjacent to, and in a manner similar to the repairs or by the Maturity Method.

C. Formed Concrete Surfaces (ACI 301 5.3.6.3)

1. Curing of formed surfaces upon early removal of forms shall be in accordance with ACI 301 5.3.6.4, Preservation of Moisture.

3.8 Repair of Surface Defects (ACI 301 5.3.7) Additional requirements as follows:

A. Match color and texture of concrete to be repaired.

B. Repair all cracks in supported concrete floor slabs and curbs by routing and sealing or epoxy injection subject to approval of Engineer.

C. Fill all air pockets and holes over 1/2 inch in diameter with a sand-cement paste. Grind smooth all form offsets or fins over 1/8 inch.

D. Remove stains, efflorescence, rust, grease and oils, form release agents, dirt, surface deposits, etc.

E. Low spots, creating puddles and bird baths which impede drainage shall be corrected by smoothing out broom lines, and grinding a drainage path (max 1/4" depth), or by patching with a specified polymer repair material.

F. High spots impeding drainage in slabs shall be corrected by grinding and re-texturing, subject to approval of Engineer.

G. Honeycombed and other defective concrete shall be patched with an approved material.

H. If shrinkage cracks appear in patch material prior to completion of initial 72-hour curing period, patch material shall be considered defective, and it shall be removed and replaced at no extra cost.

3.9 Acceptance of Structure (ACI 301 1.7)

END OF SECTION 03 3000
CONCRETE MIX DESIGN SUBMITTAL FORM

Project: __________________________ City: __________________________
General Contractor: __________________ Mix Design # __________________
Use (Describe): _____________________________________________________

DESIGN MIX INFORMATION:

Field Test Results (Standard Deviation Analysis): ____________
or Trial Mix Test Data: ____________

Specified Design Characteristics:
Strength _____ psi (28 day); Density: _____ pcf;
Maximum Slump ___ in.; Maximum w/cm _____
Air: ____% specified.

Cementitious Materials:

<table>
<thead>
<tr>
<th>Type</th>
<th>(Product Mfr. (Source))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement:</td>
<td>______________________       _________________________________________</td>
</tr>
<tr>
<td>Fly ash:</td>
<td>______________________       _________________________________________</td>
</tr>
<tr>
<td>Other:</td>
<td>______________________       _________________________________________</td>
</tr>
</tbody>
</table>

Aggregates:

<table>
<thead>
<tr>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coarse:</td>
<td>______________________       _________________________________________</td>
</tr>
<tr>
<td>Fine:</td>
<td>______________________       _________________________________________</td>
</tr>
</tbody>
</table>

Admixtures:

Air Entraining Admixture (A.E.A.): ____________________________
Water Reducing Admixture (W.R.): ____________________________
High Range Water Reducing Admixture (H.R.W.R.):
  Accelerator: ____________________________
  Silica Fume: ____________________________
  Calcium Nitrite-Based Corrosion Inhibitor: ____________________________
  Shrinkage Reducing Admixture ____________________________
  Fibrous Reinforcement: ____________________________
  Latex Emulsion: ____________________________
  Other: ____________________________
## FINAL MIX DESIGN DATA:

<table>
<thead>
<tr>
<th>MIX PROPORTIONS</th>
<th>WEIGHT ABSOLUTE VOL.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(lbs)</td>
<td>(cu. ft.)</td>
</tr>
<tr>
<td>Cement:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coarse Aggregate:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine Aggregate:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrained Air:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### RATIOS

- Fine Agg.: __________ lb __________ %
- Total Agg.: __________ lb

Fly ash to cementitious materials ratio: __________
Silica fume to cementitious materials ratio: __________
Water to cementitious ratio: __________

### SPECIFIC GRAVITIES

- Fine Agg: __________
- Coarse Agg: __________
- Other: __________

### ADMIXTURES (dosage rate 0Z per 100 lb/cement or 0Z per/yd)

- A.E.A: __________
- W.R: __________
- HRWR: __________
- Accelerator: __________
- Silica Fume: __________
- Calcium Nitrite-Based Corrosion Inhibitor: __________
- Fibrous Reinforcement: __________
- Latex Emulsion: __________
- Shrinkage Reducer: __________
- Other: __________

*NOTE: Include dosage rate schedule and correlation between dosage of chloride inhibitor and chlorides present in concrete.*
Mix # ________________________ Job Name ________________________

PLASTIC CONCRETE

Initial Slump = _____ in. Air Content = _____ %
Final Slump = _____ in. Unit Dry Wt. = _____ pcf
Unit Wet Wt. = _____ pcf

STANDARD DEVIATION ANALYSIS (from experience records):

Number of Test Cylinders Evaluated: __________  Standard Deviation: __________

\[ f'_{cr} = f_c + 1.34s \text{ or } f'_{cr} = f'_c + 2.33s - 500 \text{ for 5000 psi or less} \]
\[ f'_{cr} = f'_c + 1.34s \text{ or } f'_{cr} = 0.90 f'_c + 2.33s \text{ for higher strengths} \]

(Refer to ACI 301 for increased deviation factor when less than 30 tests are available.)

LABORATORY TEST DATA (Hardened Concrete):

<table>
<thead>
<tr>
<th>Age (days)</th>
<th>Mix #1 (comp. str.)</th>
<th>Mix #2 (comp. str.)</th>
<th>Mix #3 (comp. str.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>28</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

28-day average compressive strength: ____________ psi

Mix design proportioned to achieve \( f'_{cr} = f_c + 1200 \text{ psi for 5000 psi or less} \)
OR \( 1.10 f'_c + 700 \text{ psi for strengths higher than 5000 psi at 28 days} \).

Remarks:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

NOTE: Fill in all blank spaces. Use -0- (Zero) or N.A. (Not Applicable) where appropriate. See “Design and Control of Concrete Mixtures: 13th Edition” by Portland Cement Association, for assistance in completing this form.
Mix # ________________________ Job Name ______________

REQUIRED ATTACHMENTS:

__________ Concrete compressive strength data used for standard deviation calculations

__________ Cement mill test reports

__________ Mill test reports of fly ash chemical and physical analysis and certification of compliance with ASTM C 618 Class C or F

__________ Certification of silica fume with ASTM C 1240

__________ Coarse aggregate gradation, deleterious substances and physical property report (ASTM C 33, class designation)

__________ Coarse aggregate soundness test reports (ASTM C 88)

__________ Certification aggregate are uniform in quality, gradation, colors and quantity

__________ Fine aggregate gradation, deleterious substances and physical property report (ASTM C 33)

__________ Admixture compatibility certification letter

__________ Admixture Manufacturer's “Product Data Sheets” and “Material Safety Data Sheets”

__________ Admixture Manufacturer's certification of conformance with appropriate ASTM standards

__________ Certification of acceptability of coarse and fine aggregate for AAR and ACR performance

__________ Certification and test results of water soluble chloride ion content FHWA RD-77 or AASHTO T 260-84

__________ Air content tests of freshly mixed concrete in accordance with ASTM C 231 or ASTM C 173

__________ Corrosion inhibitor testing of plastic concrete Test Method for Calcium Nitrite Presence in Plastic Concrete (Specification Section 01 4100, Appendix A)
Submitted by Ready-Mix Supplier:

Name
Address
Phone Number
Date
Main Plant Location
Miles from Project
Secondary Plant Location
Main Plant Location
Miles from Project
PART 1 - GENERAL

1.1 Related Documents

A. The Conditions of the Contract for Construction and the General Requirements of Division 1 of these Specifications apply to the Work in this Section.

1.2 Work Included

A. The Work of this Section includes furnishing all labor, materials, equipment, and supervision to install shotcrete patching materials as indicated on the Drawings and specified herein:
   1. Slab soffit patches
   2. Wall patches
   3. Beam patches
   4. Column patches

1.3 Related Work

A. The following work is related to this Section.
   1. Selective Demolition Section 02 4119
   2. Concrete Repair Section 03 0130
   3. Concrete Formwork Section 03 1100
   4. Concrete Accessories Section 03 1500
   5. Concrete Reinforcement Section 03 2000
   6. Cast-in-Place Concrete Section 03 3000

1.4 Reference Standards

A. Comply with the provisions of the latest edition of the following Codes, Specifications, and standards except where more stringent requirements are indicated on the Drawings or specified herein.
   1. American Concrete Institute
      a. ACI 318 Building Code Requirements for Reinforced Concrete.
      b. ACI 506 Guide to Shotcrete.
      c. ACI 506.3 Guide to Certification of Shotcrete Nozzlemen.
      d. ACI 506.2 Specification for Materials, Proportioning and Application of Shotcrete.
   2. American Society for Testing and Materials
      a. As specified herein.

1.5 Quality Control
A. Perform all work in strict accordance with all applicable laws and regulations of the building code and with all other authorities having jurisdiction, except where the requirements of these Specifications are more exacting or stringent, they shall govern.

B. The Contractor or Subcontractor shall have not less than two (2) years experience in the field of structural concrete restoration work and shotcrete repair work.

C. A trial area shall be designated by the Engineer to demonstrate that the equipment, personnel, and methods of operation are capable of producing results satisfactory to the Engineer. The trial area shall consist of a minimum of 50 sf of adjacent soffit repair. Contractor shall not proceed until trial area is accepted by Engineer.

D. Notify the Testing Laboratory of scheduled shotcreting dates. Notify the Testing Laboratory and the Engineer 48 hours in advance of shotcreting.

E. Quality control sampling and testing shall be performed in accordance with ACI 506.2, Section 1.6.

1.6 Submittals

A. Contractor shall submit for review and approval shotcrete mix design prior to shotcreting.

B. Contractor to submit for record a written plan of action that includes, but is not limited to:
   1. Dust control and exhaust.
   2. Personnel communication during shotcreting.
   3. Protection of adjacent property, equipment, etc.

C. Upon request, the Contractor shall submit a written description of construction ability including equipment, facilities, personnel, and a list of similar completed projects to the Engineer.

1.7 Transportation and Handling

A. Store materials on platforms off ground, protect stored cement against elements. Handle and store aggregates separately in a manner to prevent intrusion of foreign material and to prevent segregation.

B. Protect all materials until used. Any material which has deteriorated or which has been damaged shall not be used.

1.8 Basis of Payment

A. All patching quantities shall be measured and paid on a square foot basis; estimated depth of patching is indicated on Drawings.

B. Plan drawings shall be maintained locating all repairs performed under this Section. Location and size of patches must be located on clean drawings. Separate drawings shall be maintained.
for each Level and Ceiling plan. These drawings shall be incorporated into record set required per Division 1.

PART 2 - PRODUCTS

2.1 Shotcrete Materials

A. Portland Cement shall conform to ASTM standard specification for Portland Cement C150, Type I.

B. Aggregates for shotcrete shall conform to ASTM standard specification for concrete aggregate, ASTM C33, exposure 5S.
   1. Gradation and limits for combined aggregate shall be as noted in Table 2.2.1 of ACI 506.2. Gradation No. 1 shall be used unless Contractor can demonstrate that reinforcement of the type and size to be encountered on the job can be properly encased using gradation No. 2.

C. Water is to be clean and potable.

D. Admixtures, other than those specified, will not be permitted unless specifically approved by Engineer.

E. Shotcrete shall include corrosion inhibitor, 2 gallons per cubic yard. Refer to Section 03 3000 for approved materials.

2.2 Shotcrete Properties

A. Minimum compressive strength of the shotcrete shall be 5,000 psi at 28 days. Refer to Section 2.5 ACI 506.2 for additional information.

2.3 Prepackaged Materials

A. A prepackaged material that meets the above requirements may be used.

PART 3 - EXECUTION

3.1 Inspection

A. Before commencing work, examine all adjoining work on which this work is dependent and report in writing to the Owner or Engineer any condition which prevents Contractor from performing the work. Starting work constitutes acceptance of adjoining work.
B. Remove and replace or protect all electrical conduit, mechanical conductors, light fixtures, mechanical equipment, etc., necessary for the proper completion of repairs.

C. Concrete patch preparation shall be performed in accordance with Section 02 4119, Selective Demolition and appropriate details as indicated on the Drawings.

D. Existing reinforcement and miscellaneous metal to remain shall be cleaned of rust and laitance to Near White Metal and epoxy coated as required in Section 03 2000, Concrete Reinforcement.

E. Following demolition, the condition of all reinforcing bars shall be inspected. If the bar's cross sectional loss is greater than 15%, the Contractor shall splice as directed by the Engineer. Minimal splice length shall be in accordance with ACI 318 and shall extend on either side of deterioration. Additional concrete removal may be required for placement of splice.

3.2 Shotcrete Equipment

A. Dry-mix shotcrete equipment shall be used. Mixing water shall be introduced at the nozzle.

B. Equipment shall be capable of handling 1/2" aggregate if gradation No. 2 is used (See Paragraph 2.1).

3.3 Placing Shotcrete Patch Material

A. Contractor shall maintain separate plan drawings locating all concrete repairs performed under this section. Location and size of patches must be located on drawings.

B. Beam shotcrete repair formwork shall be required. Follow recommendation in ACI 506 for formwork as well as Section 03 1100, Concrete Formwork.

C. Before placing shotcrete, formwork, if required, shall have been completed. Foreign materials shall have been removed, reinforcement shall have been secured in place and the entire preparation shall have been approved by the Engineer. Engineer shall be notified at least 48 hours prior to desired time of inspection.

D. Immediately prior to the placing of concrete, the Contractor shall thoroughly clean the cavity of foreign matter. One hour prior to placing shotcrete, pre-wet bonding surface with a uniform spray application of water. Surface shall be maintained in a damp condition.

E. Place shotcrete only when ambient temperature is 40 degrees and rising.

F. Shotcrete shall be placed to provide a minimum of 1 inch cover on all embedded steel. Minimum requirements indicated on details of the Drawings shall be met as well.

G. Shotcrete depth shall be at least equal to the depth of preparation, but shall not exceed the original concrete profile by greater than 1/2 inch.
H. Contractor shall protect all adjacent surfaces. All debris shall be cleaned off adjacent surfaces following shotcrete operations.

I. All overspray shall be removed from adjacent surfaces and patch cavities. The patch cavities shall be abrasive blasted to remove overspray prior to patching.

J. Concrete surfaces shall be trowel finish.

3.4 Curing

A. Curing shall be in accordance with ACI 506.2.

B. Curing time shall be extended as Engineer directs, when the curing temperature falls below 50 degrees F.

C. If shrinkage cracks appear in the shotcrete material prior to completion of initial 72 hour curing period, the shotcrete shall be considered defective and it shall be removed and replaced by the Contractor at no extra cost to the Owner.

END OF SECTION 03 3713
PART 1 - GENERAL

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

1.2 Work Included
A. The Work of this Section shall include furnishing all labor, materials, equipment, and supervision to prepare cracks in structural concrete members and inject them with chemical grout.

1.3 Submittals
A. Submit for record "Health and Safety Data Sheets" and Manufacturer's "Spec Data Sheet" of each product used.
B. Submit for record written procedure including all necessary steps to provide injection system in accordance with manufacturer's requirements and as specified herein.

1.4 Transportation and Handling
A. Store materials at the site in protected enclosure to keep them cool, dry and undamaged.

1.5 Warranty
A. Contractor shall provide single source warranty against water leaks for injected cracks. Warranty duration shall be five (5) years from date of project acceptance.

1.6 Quality Control
A. Chemical grout manufacturer shall make available a qualified manufacturer's representative to assist the Contractor and Engineer as specified in this Section. The representative shall be experienced in the process of chemical grouting.
B. Contractor shall maintain plan drawing sepia indicating location and length of all work performed under this section.
1.7 Basis of Payment

A. Pay basis shall be based on lineal feet (LF) transverse to the thickness of the member.

PART 2 - MATERIALS

2.1 Chemical Grout

A. Approved chemical grout systems are:
   1. "3M Scotch Seal 5600" by Avanti International, Webster, TX
   2. "Hydro Active Flex LV" by DeNeef Construction Chemicals, Inc., Houston, TX
   4. "Prime-Flex 900 LVSF" by Prime Resins, Inc., Conyers, GA
   5. or Approved Equivalent

2.2 Injection Ports

A. Injection ports ("packers" or "zerks") shall be 1/2" or 5/8" diameter capable of withstanding a minimum of 3000 psi injection pressure. Injection ports shall have hydraulic lubrication fittings with check valve designed to automatically prevent back flow of resin.

B. Approved injection ports are:
   1. "1/2" or 5/8" Packers", by Packer Products, Maple Grove, MN
   2. "1/2" or 5/8" Mechanical Packer", by WEBAC America Corp., Costa Mesa, CA
   3. "DEN-P 1/2" pf 5/8"", by DeNeef Construction Chemicals, Inc., Waller, TX
   4. "PP-500 or PP-625", by Prime Resins, Inc., Conyers, GA
   5. or Approved Equivalent

PART 3 - EXECUTION

3.1 Preparation

A. The Contractor shall review with the Engineer cracks to be grouted prior to work.

B. The Contractor shall clean cracks of any mud, laitance, or other material which could impair bond.

C. The Contractor shall clean the surfaces around the crack of all salt, lime or other material deposits.

D. Contractor to clean and flush crack as recommended by manufacturer.

E. The Contractor shall perform additional preparation specified by the manufacturer.
3.2 Installation

A. Drill holes for injection ports at a 45 degree angle to the wall at a distance from the crack so the drilled hole intersects the crack approximately half the wall thickness. Space holes at 12" o.c. (maximum) or per Manufacturer’s recommendation if less than 12".

B. Install injection ports (“packer” or “zerk”) into holes and tighten. Note, adhesive surface mounted injection ports are prohibited.

C. Mixing and proportioning of materials shall be as directed by the manufacturer and in accordance with all applicable safety codes.

D. It is the responsibility of the Contractor to provide appropriate protective measures to ensure that the chemical grout is under control of the Contractor at all times.

E. Injection equipment shall be capable of injecting grouts up to a minimum of 3000 psi. All grout will be injected under such pressure so as not to damage the existing structure.

F. Number and location of grout ports shall be approved by manufacturer. Maximum grout port spacing not to exceed 2'-0".

G. Injection of chemical grout shall begin at the lowest elevation and proceed upward on vertical cracks or shall begin at one end and proceed toward the other end on horizontal cracks.

H. Injection of chemical grout shall continue at the first port until grout is observed at the next port. The valve on the first shall then be closed and the supply line disconnected. Grout shall then be injected into the second port. This operation shall be repeated until the crack has been completely grouted. When serious grout leaks are observed at the surface, they shall be immediately plugged with rags or Oakum dipped in chemical grout or by other approved methods.

3.3 Cleanup

A. Remove injection ports and surface-applied materials. Leave concrete surface clean and free of all residues, gels and other temporary installations required for injection. Patch all injection ports with an approved concrete patching material.
SECTION 07 1800 – TRAFFIC COATINGS

PART 1 - GENERAL

1.1 Related Documents

A. Conditions of Contract for Construction and General Requirements of Division 1 of these Specifications apply to Work in this Section.

1.2 Work Included

A. Work of this Section shall include furnishing all labor, materials, equipment and supervision to install a deck coating system, including surface preparation and crack and joint detailing.

B. Deck coating Installer shall be specifically responsible for providing all preparation Work and joint sealants specified in Section 07 9200, Joint Sealants.

1.3 Related Work

A. Following Work is related to this Section:

1. Concrete Repair Section 03 0130
2. Cast-in-Place Concrete Section 03 3000
3. Joint Sealants Section 07 9200

1.4 Quality Control

A. General

1. Deck coating Installer shall be approved by deck coating Manufacturer.
2. Installer shall have a minimum of five (5) years experience in application of one of the approved deck coating systems and have experience with five projects in size of 25,000 SF or greater.
3. Installer and Manufacturer shall review slope of slabs and condition of surfaces prior to bidding.
4. Manufacturer shall make available a qualified Manufacturer's Representative to assist the Installer and Engineer as specified herein. Representative shall be experienced in placement of deck coating systems. As a minimum, Representative shall be on site to review following procedures:
   a. Surface preparation.
   b. Installation of deck coating from primer to top coat for first level or first phase.
5. A preconstruction/preapplication meeting shall be held to discuss detailing, surface preparation, application techniques and procedures, phasing and scheduling. Foreman and lead laborer for Installer will be required to attend meeting along with Contractor, Manufacturer’s Representative and Engineer.

B. Testing Requirements

1. Installer shall check deck coating wet film thickness and record test results by taking five wet film readings within a 1 SF area. Wet film thickness testing shall be completed a minimum of once per every 500 SF of deck coating placed or per individual section placed per day. Average film thickness shall be at or above wet film thickness equivalent of specified dry film thickness.

C. Flood Test: Contractor shall arrange for and wet all slabs with water for purpose of detecting any defects in waterproofing which would result in leaks. Slab surfaces shall be wetted until water flows freely to drains. No finished spaces shall be insulated or ceiling installed until drainage test has been completed on the slab above and reviewed by Engineer for acceptance.

1. Potentially leaks are located by noting whether water from flood test is observed at underside of slabs or running down faces of walls. Leaking attributed to defective traffic bearing membrane shall be corrected by repairing waterproofing.

1.5 Submittals

A. Action Submittals

1. System Description: Submit complete description of proposed traffic coating system including materials, surface preparation, joint treatments, terminations, and cure times. Include aggregate materials and repair materials for pitting, bug holes, popouts, and shallow scaling.

2. Product Data: For each type of product, including installation instructions.
   a. Traffic Coating System
   b. Substrate Repair Material
   c. Primer
   d. Base Coat
   e. Intermediate Coat (grit coat)
   f. Top Coat
   g. Aggregate

3. Shop Drawings: For traffic coatings.
   a. Include details for treating substrate joints and cracks, flashings, deck penetrations, and other termination conditions.
   b. Include proposed plan for grid layout to install each coat. Include quantities of materials, square footages, and yield calculations.

4. Color: Submit Manufacturer’s standard color chart.

5. Sample Warranty: Submit sample warranty for approval prior to application.
B. Informational Submittals

1. Qualification Data:
   a. For Installer including projects, size, location, owner, and contact, engineer/architect and contact for projects that traffic coating system has been applied.
   b. Certification that Manufacturer has approved Installer.

2. Certificates: For each type of traffic coating.
   a. Certification that the traffic coating system is compatible with all products in Divisions 3 and 7 to which it will come in contact.
   b. Certification of Manufacturer’s approval of surface preparation.
   c. Certification of Manufacturer’s project review and that traffic coating installation is in accordance with written recommendations.

3. Field quality-control reports:
   a. Results of slab moisture testing completed in accordance with ASTM D 4263 Standard Test Method for Indicating Moisture in Concrete by Plastic Sheet Method.
   b. Results of wet film thickness testing. Include date, weather, and other pertinent information.

4. Applicator’s Manual: For each type of traffic coating.

5. Material Safety Data Sheets: For each product, solvent, or related chemicals to be used and certification that materials conform to local, state, and federal environmental and worker’s safety laws and regulations.

1.6 Environmental Requirements

A. Manufacturer and Installer are required to confirm that all deck coating materials used in accordance with this Section conform to local, state, and federal environmental and workers’ safety laws and regulations.

1. VOC content of materials shall not exceed limits per Environmental Protection Agency Natural Volatile Organic Compound Emission Standards for Architectural Coatings (40CFR59).

B. Installer is solely responsible for fume control and shall take all necessary precautions against injury to personnel or adjacent building occupants during application. As a minimum, Installer shall take the following precautions:

1. Provide and maintain barricades.
2. Locate and protect building air intakes during application.
3. Follow all state, federal, and local safety regulations.
4. Follow all Manufacturers’ safety requirements.
5. Dispose empty containers immediately and properly.
6. Use protective equipment.
7. Ensure Work area is well vented to outside.
C. Deck coating shall be installed between 6:00 p.m. and 6:00 a.m. on weekdays and anytime during weekends.

1.7 Transportation and Handling

A. Deliver all materials to site in original, unopened containers, bearing following information:
   1. Name of product
   2. Name of Manufacturer
   3. Date of Manufacturer
   4. Lot or batch number
   5. UL Labels

B. Store materials under cover, protected from weather, within Manufacturer's recommended temperatures ranges.

C. Replace containers or materials showing any signs of damage with new material at no additional cost to Owner.

D. At no time shall weight of stored material placed on a slab area exceed 30 PSF or 2,000 lbs. over 20 square inches.

1.8 Warranty

A. Provide to Owner a Warranty by Installer and Manufacturer that deck coating system will be free of defects, water penetration, and chemical damage related to system design, workmanship or material deficiency, consisting of, but not limited to:
   1. Surface crazing of other weathering deficiency (including ultraviolet light exposure).
   2. Abrasion or tear failure resulting from normal traffic use.
   3. Tear failure resulting from new or existing cracks in substrate not exceeding 1/16 inch in width.
   4. Debonding from substrate or delaminating between layers.
   5. Defective installation.
   6. Debonding or damage of repair material used for filling in pitting, bug holes, popouts, and shallow scaling with concrete or deck coating material.

B. Warranty shall be "Joint and Several" in which Installer and Manufacturer will jointly and severally warrant and provide at no charge to Owner materials and labor needed to properly repair or replace product and replace parking stripes within duration of Warranty. In event of either party's non-performance, full burden and responsibility for any Warranty repair shall fall upon remaining party.

C. Vandalism, abrasive maintenance equipment, and construction traffic are not normal traffic use and are exempt from Warranty.
D. Normal traffic is considered to include snow removal equipment with rubber tipped blades as described in National Parking Association publication, "Parking Garage Maintenance Manual".

E. New concrete may experience shrinkage. Installer shall provide system suitable for such application. Warranty shall cover deck coating damage due to new concrete slab cracking not exceeding 1/16 inch.

1.9 Warranty Duration

A. Bid price shall include a five (5) year Warranty commencing with date of project acceptance in accordance General Conditions.

B. Although completed areas of facility may be reopened to traffic and parking, commencement of Warranty period will not occur prior to acceptance of entire project.

C. A single Warranty commencement date will apply to all waterproofing.

1.10 Basis of Payment

A. Deck coating preparation and application will be paid on a unit price or lump sum basis. Refer to Bid Form.

B. Detail coats over cracks, construction joints, cove joints, etc. are to be incidental to deck coating cost.

PART 2 - PRODUCTS

2.1 Deck Coating - General

A. Deck coating system shall be a fluid applied, waterproof, traffic bearing elastomeric membrane capable of preventing penetration of concrete by water, gasoline, oils, greases, salts, deicer chemicals, battery acids and radiator coolants.

B. Color of deck coating shall be gray with Owner selecting shade of gray from standard color chart submittal.

C. Material to fill in pitting, bug holes, popouts, and shallow scaling shall be in accordance with Manufacturer's written recommendations.

D. Same Manufacturer's deck coating system shall be used throughout.

E. Deck coating thicknesses specified herein are minimum dry film thicknesses and do not include the aggregate. Specified thicknesses may vary from Manufacturer's literature. A coat may have to be installed in more than one layer to achieve minimum thickness or on ramps a slope grade
version of deck coating material shall be used. Install each coat in accordance with Manufacturer’s recommended yield for required thickness.

F. Thinner or solvent shall not be added to deck coating materials.

G. All deck coating shall utilize a UV stable topcoat.

H. Top coat shall be seeded with aggregate and back rolled.

2.2 Deck Coating System (Solvent Free System)

A. Provide a heavy duty epoxy deck coating system as indicated on Drawings.

B. Approved heavy duty epoxy solvent free deck coating systems are:

1. Iso-Flex 760 EU HL (extreme duty), LymTal International, Inc., Orion, MI. Primer, base coat at 25 mils, epoxy grit coat at 25 mils, and a top coat at 18 mils.

2. Auto-Gard E Severe Duty, Neogard Corp., Dallas, TX. Primer, base coat at 25 mils, epoxy grit coat at 25 mils, and a top coat at 18 mils.


6. Flexdeck System, RPM Company, Cleveland, OH. Primer, base coat at 25 mils, epoxy grit coat at 25 mils, and a top coat at 18 mils.

7. Sikalastic 720/Sikadur 22 Lo-Mod, Sika Corporation, Lyndhurst, NJ. Primer, base coat at 25 mils, epoxy grit coat at 25 mils, and a top coat at 18 mils.

2.3 Deck Coating Aggregate

A. Approved aggregates for heavy duty deck coating systems shall be a size of 12/20 and approved by coating manufacturer.

PART 3 - EXECUTION

3.1 General

A. Inspect surfaces to receive Work and report immediately in writing to Engineer as required in General Conditions any deficiencies in surface which render it unsuitable for proper execution of this Work. Do not proceed with Work until unsatisfactory conditions have been corrected in an acceptable manner in accordance with Engineer.

B. Coordinate and verify that related Work meets following requirements:
1. Concrete surfaces are finished, cleaned and prepped, and have completed required curing period.
2. Previous surface treatments have been removed or are compatible with the systems to be installed.
3. Systems selected for use are compatible with each other.
4. All concrete repairs are completed.
5. Sealant installation may occur several months prior to deck coating. Installer to repair damaged or defective sealants prior to deck coating installation.

3.2 Preparation

A. Remove all oil, grease spots, and contaminate in accordance with Manufacturer’s recommendations.

B. Remove all existing striping.

C. Shotblast all concrete surfaces to receive deck coating. Shotblast equipment performance requirements are as follows:

1. Equipment shall be capable of traveling at a constant speed to provide uniform profile. Speed and size of equipment and size of steel shot shall be selected to provide desired preparation without causing unnecessary damage to concrete surface.
2. Equipment shall vacuum up, or otherwise retain all dirt, dust, and debris from blasting operation.
3. Areas inaccessible to shotblaster (i.e. vertical surfaces, against walls, columns, stairways, etc.) are to be abrasive blasted or abraded to same performance.
4. Shotblasted surface must be clean with a profile in which a minimum 1/16 inch of existing concrete surface is removed. Fine aggregates must be exposed; however, coarse aggregate must not be exposed. All laitance must be removed. Surface profile to match ICRI CSP5 in accordance with ICRI Guideline No. 03732, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.
5. Remove debris immediately after surface preparation. Debris includes, but is not limited to, shot, aggregate and dust. Debris shall be placed in a covered dumpster or a covered area where it will not be rebroadcast by wind or weather.

D. Metal surfaces that are to be deck coated shall be abrasive blasted to near white metal, SSPC SP10 in accordance with Steel Structures Painting Council Painting Manual. Rust inhibitive primer shall be installed in accordance with Manufacturer’s recommendations within 8 hours of abrasive blasting.

E. Rout and seal cracks greater than 15 mils in accordance with Section 07 9200, Joint Sealants or as required by the Manufacturer. Cracks, coves, terminations and all unusual situations shall be detailed per Manufacturer’s recommendations.

F. Installer shall be responsible for repair or replacement of all materials damaged by surface preparation operations.
G. Surfaces shall be air blown with sufficient pressure to remove excess dirt, dust and debris, and to assure that concrete is clean prior to application of deck coating.

H. After shotblasting and abrasive blasting and prior to first coat of deck coating, pitting, bug holes, popouts, and shallow scaling shall be prepared in accordance with Manufacturer's recommendations. As a minimum, a thin epoxy mortar shall be used to fill voids.

3.3 Installation/Application

A. Do all Work in strict accordance with Manufacturer's written instructions and specifications and as indicated herein.

B. Do not apply deck coating materials until concrete has been air dried at temperatures at or above 40 degrees F. for at least 28 days after curing period specified in Section 03 3000, Cast-In-Place Concrete, Section 03 0130, Concrete Repair, or as otherwise approved by Manufacturer.

C. Concrete shall be dry prior to application of deck coating. Installer shall perform slab moisture testing in accordance with ASTM D 4263 Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method. Testing must be performed in at least 1 location for every 10,000SF of coating. Use of heat lamps for performing tests may be required in areas not exposed to sunlight.

D. Do not apply deck coating material until concrete and air temperature is at or above 40 degrees F. Provide appropriate enclosures and necessary heating for application. Air temperatures directly below and above the slab being coated must be maintained at a minimum of 45 degrees F up to 48 hours prior to coating and at 45 degrees F for a minimum of 72 hours after coating, or as required for full curing of material. Provide high/low thermometers within Work area. As a minimum, provide two thermometers directly below slab and two directly above slab being coated.

E. All deck coating shall maintain straight edges at terminations.

F. Surfaces to be deck coated shall be divided into areas in accordance with the Manufacturer's recommended yield for the specified thickness and for specific container size of material. Area is to be divided by keel marks, or another Engineer approved method.

G. All sealants to be provided adequate cure time, minimum 8 hours, to be tack free prior to deck coating. All construction joints, control joints, joints at perimeter of patches, cold joints and cracks (sealed and unsealed) shall receive a detail coat, minimum of 4 inches wide. Detail coat shall be same thickness as base coat unless Manufacturer's requirements are stricter. Detail coat shall cure a minimum of 12 hours prior to base coating.

H. Extend deck coating up vertical surfaces as indicated on Drawings.

I. Incorporate aggregate until refusal. Aggregate until refusal will result in a surface that is tan in color. Additional aggregate may have to be added after first pass. Seed topcoat with aggregate and backroll.
J. Complete all Work under this Section before painting line stripes.

3.4 Damage and Repairs

A. Any necessary repairs for deck coating resulting from dry film testing are to be repaired by Installer.

B. Pinholing of deck coating will be cause for rejection. Installer shall repair and take necessary steps to prevent pinholing to occur at no additional expense to Owner.

3.5 Cleanup

A. Remove all excess primer, sealant, deck coating, and masking materials from structure.

END OF SECTION 07 1800
SECTION 07 9200 – JOINT SEALANTS

PART 1 - GENERAL

1.1 Related Documents
   
   A. Conditions of Contract for Construction and General Requirements of Division 1 of these Specifications apply to Work in this Section.

1.2 Work Included
   
   A. Work of this Section shall include furnishing all labor, materials, equipment, and supervision to install joint sealants, including surface preparation.

   B. Work included by joint sealant Installer shall include deck coatings specified in Section 07 1800, Traffic Coatings.

1.3 Related Work
   
   A. Following Work is related to this Section:

   1. Concrete Repair Section 03 0130
   2. Cast-in-Place Concrete Section 03 3000
   3. Traffic Coatings Section 07 1800

1.4 Quality Control
   
   A. General

   1. Joint sealant Installer shall be approved by joint sealant Manufacturer.
   2. Joint sealant Installer shall have a minimum of five (5) years experience in application of one of approved joint sealant systems and have experience for a project in size of 5,000 LF or greater.
   3. Manufacturer shall make available a qualified Representative to assist Installer and Engineer as specified herein. Representative shall be experienced in placement of sealant material.

1.5 Submittals
   
   A. Action Submittals:

   1. Manufacturer's Spec Data Sheets of each product to be used.
2. Complete description of the joint sealant system including primer, sealant material, and backer rods or bond breakers. Also indicate placement and installation procedures along with material working requirements, shelf life, and performance data.

3. Qualification statement of Installer stating projects, size and location.

4. Sample Warranty prior to application.

B. Informational Submittals:

1. Sequence of sealant placement in structure. The sealant installation shall be coordinated to allow required minimum concrete cure times.

2. Material Safety Data Sheets of each product, solvent, or related chemicals to be used and certification that materials conform to local, state and federal environmental and worker’s safety laws and regulations.

3. Certification that joint sealant system is compatible with all products in Divisions 3, 7, and 9 to which it will come in contact.

1.6 Environmental Requirements

A. Manufacturer and Installer are required to confirm that all materials used in accordance with this Section conform to local, state, and federal environmental and workers’ safety laws and regulations.

1. VOC content of materials shall not exceed the limits per Environmental Protection Agency National Volatile Organic Compound Emission Standards for Architectural Coatings (40CFR59).

1.7 Transportation and Handling

A. Deliver all materials to site in original, unopened containers, bearing following information:

1. Name of product
2. Name of Manufacturer
3. Date of manufacture
4. Lot or batch number
5. UL labels

B. Store materials under cover and protected from weather, within Manufacturer’s recommended temperature ranges.

C. Replace packages or materials indicating any signs of damage with new material at no additional cost to Owner.

D. At no time shall the weight of stored material placed on a slab area exceed 30 PSF or 2,000 lbs. over 20 square inches.

1.8 Warranty
A. Provide to Owner a Warranty by Installer and Manufacturer that joint sealant system will be free of defects, water penetration, and chemical damage related to design, workmanship, or material deficiency, consisting of, but not limited to:

1. Surface crazing or other weathering deficiency.
2. Abrasion or tear failure resulting from normal traffic use.
3. Tear failure resulting from anticipated movement.
4. Debonding from substrate or delaminating between layers.
5. Defective installation.

B. Warranty shall be “Joint and Several” in which Installer and Manufacturer will jointly and severally warrant and provide at no charge to Owner materials and labor needed to properly repair or replace product and replace parking stripes within duration of Warranty. In event of either party’s non-performance, full burden and responsibility for any Warranty repair shall fall upon remaining party.

C. Normal traffic is considered to include snow removal equipment with rubber tipped blades as described in the National Parking Association publication, Parking Garage Maintenance Manual.

D. Vandalism, abrasive maintenance equipment, and construction traffic are not normal traffic use and are exempt from Warranty.

1.9 Warranty Duration

A. Bid price shall include a five (5) year Warranty commencing with date of project acceptance in accordance with General Conditions.

B. Although completed areas of facility may be opened to traffic and parking, commencement of Warranty period will not occur prior to acceptance of entire project.

C. A single Warranty commencement date will apply to all waterproofing.

1.10 Basis of Payment

A. Cove sealants, crack sealants, construction joint sealants, and precast joint sealants will be paid on a unit price or lump sum basis. Refer to Bid Form.

B. Joint widening or other necessary modifications shall be incidental to system cost.

PART 2 - PRODUCTS

2.1 Joint Sealant System - Polyurethane

A. Horizontal Joint Sealant (except cove joints)
1. Traffic-bearing, multi-component, self-leveling or non-sag unmodified polyurethane sealant, gray in color unless noted otherwise, containing no coal tar, asphalt, or other adulterants and conforming to ASTM C 920, Standard Specification for Elastomeric Joint Sealants, Type M, Grade P or NS, Class 25, use T and Federal Specification TT-S-00227, Type I or II, Class A.

2. On slopes greater than 2%, slope grade versions of specified self-leveling sealants or non-sag sealants, as specified for vertical and cove joint sealants, are to be used per Manufacturer’s recommendations.

3. Approved Horizontal Joint Sealants are:
   a. Iso-Flex 880GB or 881, LymTal International, Inc., Orion, MI.
   b. Urexpan NR-200 or Dynatred, Pecora Corp., Harleysville, PA.
   c. Sikaflex - 2c NS/SL, Sika Corp., Lyndhurst, NJ.
   d. MasterSeal SL2, Sonneborn Building Products, BASF Building Systems, Shakopee, MN.
   e. THC 900 or THC 901, Tremco Inc., Cleveland, OH.
   f. Vulkem 245, Tremco Inc., Cleveland, OH.

B. Vertical and Cove Joint Sealants

1. Multi-component, non-sag unmodified polyurethane sealant, gray in color unless otherwise noted, containing no coal tar, asphalt, or other adulterants and conforming to ASTM C 920, Type M, Grade NS, Class 25, use NT and Federal Specification TT-S-00227E, Type II, Class A.

2. Approved Vertical and Cove Joint Sealants are:
   b. Dynatrol II, Pecora Corp., Harleysville, PA.
   c. Sikaflex - 2c NS, Sika Corp., Lyndhurst, NJ.
   d. MasterSeal NP2, Sonneborn Building Products, BASF Building Systems, Shakopee, MN.
   e. Dymeric 240 FC, Tremco Inc., Cleveland, OH.
   f. Vulkem 116, Tremco, Inc., Cleveland, OH.

2.2 Backer Rod

A. Backer rod diameter shall be as recommended by Manufacturer for joint sizes indicated on Drawings.

B. Backer rod shall be extruded round, closed cell or bi-cellular, low-density polyethylene or polyolefin foam material with a skin-like outer texture.

C. Approved closed cell backer rods are:
   1. Mile High Foam Backer Rod, Backer Rod Manufacturing, Inc., Denver, CO.
   2. ITP Standard Backer Rod Insulation, Industrial Thermo Polymers Limited, Buffalo, NY.
   3. HBR, Nomaco, Inc., Zebulon, NC.
   4. MasterSeal 920 Closed-Cell Backer-Rod, BASF Building Systems, Shakopee, MN.
PART 3 - EXECUTION

3.1 Inspection

A. Inspect surfaces to receive Work and report immediately in writing to Engineer as required in General Conditions any deficiencies in surface which render it unsuitable for proper execution of this Work. Do not proceed with Work until unsatisfactory conditions have been corrected in an acceptable manner. Commencement of Work implies acceptance of related Work.

3.2 General

A. Coordinate and verify that related Work meets following requirements.

1. Concrete surfaces are finished, cleaned and prepped, as specified by Manufacturer for system to be installed.
2. Curing compounds used on concrete surfaces are compatible with Work to be installed.
3. Systems selected for use are compatible with each other.

B. Installer shall take necessary precautions against injury to personnel or adjacent building occupants during installation of joint sealants. Installer personnel shall use protective equipment and area shall be well vented to outside.

3.3 Preparation

A. Grind joint edges smooth and straight prior to installation.

B. All surfaces that are to receive joint sealant shall be dry and thoroughly cleaned by mechanical means of all loose particles, existing joint sealant, laitance, dirt, dust, oil, grease or other foreign matter. Mechanical methods, such as grinding or sandblasting, shall be used to clean joint surfaces to sound, virgin concrete.

C. Check preparation of substrate to ensure adhesion of joint sealant.

D. Correct unsatisfactory conditions in a manner acceptable to Manufacturer and Engineer before installation of joint sealant system.

E. Rout cracks with a grinding tool to produce the profile indicated on Drawings. Crack must be centered in the routed notch.
3.4 Installation/Application

A. Do all Work in strict accordance with Manufacturer’s written instructions and specifications and as indicated on Drawings.

B. Do not apply joint sealant system until concrete has been air dried at temperatures at or above 40 degrees F. for at least 28 days after curing period specified in Section 03 3000, Cast-In-Place Concrete, Section 03 0130, Concrete Repair, or as otherwise approved by Manufacturer.

C. Install bond breaker or backer rod as indicated on Drawings.

D. Prime all joints and cracks.

E. Completely fill joint with sealant, without sagging or smearing onto adjacent surfaces.

F. In areas not receiving deck coating, fill horizontal joints and cracks until slightly recessed to avoid direct contact with wheel traffic.

G. Cease installation under adverse weather conditions, or when temperatures are below 40 degrees F or below or above Manufacturer’s recommended limitations.

H. Protect joint sealant as required until sealant is fully cured.

3.5 Cleanup

A. Remove all excess primer, sealant, and masking materials from structure.

END OF SECTION 07 9200