TOWN OF GREENWICH
PURCHASING DEPARTMENT
101 Field Point Road
Greenwich, CT 06830
203 622-7881

NO.: 7527

ISSUE DATE: 10/18/19

DEADLINE DATE: 11/14/19

DEADLINE TIME: 3:00 P.M.

X REQUEST FOR BID

____ REQUEST FOR PROPOSAL

PREBID CONFERENCE: X

TIME AND DATE: 11/01/19 at 10:00 AM

LOCATION: Town Hall, Gisborne Room, 1st Floor
101 Field Point Rd., Greenwich, CT 06830

ITEM/CATEGORY TOWN HALL PARKING GARAGE REHABILITATION

LOCATION GREENWICH, CT

X BID SECURITY REQUIRED. (SEE ATTACHED)

X PERFORMANCE, MAINTENANCE & PAYMENT BOND REQUIRED. (SEE ATTACHED)

X GENERAL SPECIFICATIONS (SEE ATTACHED)

X INSURANCE REQUIRED (SEE ATTACHED)

X MINIMUM PREVAILING WAGE PER STATE OF CONNECTICUT WAGE RATE SCHEDULE REQUIRED. (SEE ATTACHED)

PLEASE NOTE:

1. Sealed Bids/Proposals are due at the Town of Greenwich Purchasing Department on date noted. NO bids/proposals will be accepted after the date and time specified above. Whether the bid/ proposal is sent by mail or commercial express service, the bidder/proposer shall be responsible for actual delivery of the bid/proposal to the PURCHASING DEPARTMENT before the deadline time. Bids/proposals received after the deadline time will not be considered. PLEASE CLEARLY INDICATE BID/PROPOSAL NUMBER ON LOWER LEFT-HAND CORNER OF ENVELOPE.
2. BIDS/PROPOSALS ARE NOT ACCEPTED BY FAX OR E-MAIL.
3. COMPANY NAME AND ADDRESS MUST CONFORM ON ALL DOCUMENTS INCLUDING INSURANCE DOCUMENTS. A POST OFFICE BOX ADDRESS IS NOT ACCEPTABLE.
4. Bid/Proposal number must appear on all bids and related correspondence.
5. The Town of Greenwich is exempt from Federal and State Taxes.
6. The Town will consider an alternate bid only if bidders have been permitted to provide an alternate bid. An alternate bid must be clearly identified as such in order to be considered by the Town.
7. Stated prices are to be FOB destination inside delivery, unless otherwise specified herein.
8. Terms and Conditions indicated on reverse.

Renata Michalski

Renata Michalski, Senior Buyer

Terms and Conditions

Bidders shall familiarize themselves with all provisions of the specifications and shall not at any time after submitting bid, dispute any of the specifications or assert that there was any misunderstanding in regard to the furnishing and delivering of the items called for in the proposal.

The Town of Greenwich reserves the right to issue addenda as needed on bids/proposals.

The Town of Greenwich reserves the right to reject any and all bids not deemed to be in the best interest of the Town of Greenwich, or to accept that bid which appears to be in the best interest of the Town of Greenwich. The Town of Greenwich reserves the right to waive any informalities in or reject any or all bids, or any part of any bid.

References to a particular trade name or manufacturer's catalog or model number are made for descriptive purposes to guide the bidder in interpreting the requirements of the Town of Greenwich. They should not be construed as, nor are they intended to exclude proposals on other types of materials, equipment and supplies. However, the bidder, if awarded a contract will be required to furnish the particular item referred to in the specification or description unless a departure or substitution is clearly noted and described in the proposal.

Respondents shall provide one proposal and bidders one bid price for each specified required line item with no more than one total lump sum bid, unless allowed to do otherwise by the solicitation. Respondents shall provide no more than one bid reply unless allowed by the solicitation. Bidders shall not include in their prices any Federal or State taxes from which the Town of Greenwich is exempt.

The successful bidder/s shall indemnify the Town of Greenwich against all losses, claims, actions and judgments brought or recovered against the contractor or the Town of Greenwich. Any respondent that takes exception to the insurance requirements set forth by the Town of Greenwich Risk Manager shall be deemed unresponsive.

No proposal shall be received from, or contract awarded to, any person, firm or corporation who is in default or in debt to the Town of Greenwich for non-performance of any contract, or who is a defaulter as surety or otherwise from any obligation to the Town of Greenwich.

Bids must be signed in ink by the vendor. No bids shall be made in pencil. Any bids showing any erasures or alterations must be initialed by the bidder in ink. Failure to sign and give all information requested in the proposal may result in the bid being rejected.

Quantities as listed on the bid sheets are estimated for bidding purposes only. Award of contract shall be for the quantities actually ordered as needed during the contract period. However, the Town of Greenwich reserves the right to increase or decrease the quantities by 10%.

Unit prices quoted shall be net exclusive of all taxes, and must include all transportation, delivery and unloading costs; fully prepaid F.O.B. destination in place inside delivery. Debris, if any, removed.

The Town of Greenwich reserves the right to make awards on an item by item, total or lump sum basis. Where an award is made on an item by item basis, the unit price prevails. The Town reserves the right to make award in best interest of its own operation. All awards are contingent upon certification by the Town Comptroller that funds are available in appropriate accounts.

It is understood that prices shall hold firm and prevail for the actual quantities required or ordered as needed during the life of the contract whether more or less than estimated quantities. Unit prices shall not be subject to any increase during the life of the contract.

All deliveries are to be made within the time period specified in the bid proposal upon receipt of written purchase order or authorized verbal requests except as may be otherwise arranged by Supplier and Purchaser. Receipt of contract is not authority to ship. Emergency deliveries are to be made within twenty-four (24) hours from receipt of a telephone request from the Town of Greenwich. All deliveries are to be made on business weekdays between the hours of 9:00 A.M. and 4:00 P.M. except as may be otherwise arranged by the Supplier and Purchaser.

In the event deliveries are not made as specified to a Town delivery point, the Town of Greenwich shall reserve the right to purchase any such bid item on the open market and to charge any increase in price paid over the current contract price to the account of the vendor.

All bids will be awarded or rejected within sixty (60) days of bid opening date or for the stated period of validity, if different. Therefore, bidder agrees that prices will remain firm for acceptance for that period.

Terms of payment to the Contractor shall be net/30 days after receipt of invoice and acceptance and approval of the services by the Town of Greenwich.

The contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The contractor, however, will take affirmative action to insure that minority group members are employed and are not discriminated against during employment. Such actions shall include, but not be limited to the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection of training, including apprenticeship.

The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract of understanding, a notice advising the labor union or worker's representative of the contractors' commitments under this specification and under rules, regulations and orders promulgated by the State.

"Affirmative Action" means procedures which establish hiring and employment goals, timetables, and practices to be implemented, with good faith efforts, for minority group members.

"Minority Group Members" as identified in EEO-4 reports shall mean Black, Hispanic, Asian or Pacific Islanders, American Indian, and Alaskan Natives.

The contractor or subcontractor offers and agrees to assign to the public purchasing body all right, title and interest in and to all causes of action it may have under Section 4 of the Clayton Act, 15 U.S.C. Section 15, or under Chapter 624 of the General Statutes of Connecticut, arising out of the purchase of services, property or intangibles of any kind pursuant to a public purchase contract or subcontract. This assignment shall be made and become effective at the time the public purchasing body awards or accepts such contract, without further acknowledgment by the parties.

TOWN OF GREENWICH, CT

REQUEST FOR BID #7527 DUE: 11/14/19 AT: 3:00PM

TOWN HALL PARKING GARAGE REHABILITATION

The Purchasing Department of the Town of Greenwich, on behalf of the Office of the First Selectman, is seeking bids for the rehabilitation of the Town Hall Parking Garage located at 101 Field Point Road in Greenwich, CT, as per the specifications and drawings of this RFB.

DRAWINGS AND TECHNICAL SPECIFICATIONS

The drawings are attached to this RFB as **Exhibit I.** The drawings may also be viewed and/or printed free of charge from the Town's website: www.greenwichct.org/bids.

Upon request, a PDF version of the drawings is available. Please contact the Purchasing Department with your request, 203-622-7881.

TIME FRAME

The project shall be completed within 3 years.

The anticipated timeframe is April 2020 to April 2023.

Bidder acknowledges that Phase I of the project shall be substantially completed by **August 14, 2020,** weather permitting.

PRE-BID CONFERENCE & SITE VISIT

A non-mandatory pre-bid conference is scheduled for **Friday, November 1st, 2019 at 10:00 AM, at the Town Hall, Gisborne Room, 1st Floor, 101 Field Point Road, Greenwich, CT 06830.** Contractors will be able to view the work areas and to ask any questions related to this project. Attendance is highly recommended.

ISSUING AUTHORITY

Ms. Renata Michalski, Senior Buyer, has been designated to be responsible for the conduct of this project. Any inquiries or requests regarding this project must be submitted in writing to Ms. Michalski to the address below by: **Wednesday, October 30th, 2019 at 11:00 AM.**

Town of Greenwich Purchasing Department
101 Field Point Road
Greenwich, CT 06830

Email: rmichalski@greenwichct.org

ISSUANCE OF ADDENDA

The Town of Greenwich reserves the right to amend this solicitation by addenda. Addenda will be posted to the Town's website (www.greenwichct.org/bids) up to 48 hours in advance of the proposal's due date and time. **It is the Bidder's responsibility to check the Town's website for addenda.** If in the Town's opinion revisions are of such a magnitude, the deadline for this

solicitation may be extended in an addendum. In addition, addenda can change specifications, Reply Sheets, and times and dates for pre-bid meetings as well as due dates/deadlines for questions and proposals. **No notification of addenda issuance will be made other than on the Town's website.**

TAXES

The Town of Greenwich is exempt from the payment of taxes imposed by the federal government and or state of Connecticut, and such taxes shall not be in the prices.

BIDDING COSTS

The Bidder shall be responsible for all costs incurred in the development and submission of the bid. ***All submissions become property of the Town of Greenwich.***

STATE, LOCAL AND FEDERAL LAWS

The Bidder shall acknowledge and agree that, should it be awarded the Contract, it shall be solely responsible for strict compliance with all federal, state and local statutes, laws, codes, rules, regulations and ordinances, and for the procurement and maintenance of all necessary licenses and permits relating to the performance of services.

APPLICABLE LAW

The laws of the State of Connecticut shall govern this Contract and any and all litigation related to this Contract. In the event of litigation related to this Contract, the exclusive forum shall be the State of Connecticut and the exclusive venue for such litigation shall be the Judicial District for Stamford/Norwalk at Stamford.

CONTRACT FORMAT

The Town of Greenwich has included as part of this RFB, **Exhibit C**, the sample Agreement Contract format to be used for this project.

WITHDRAWAL OF BIDS (OR PROPOSALS) PRIOR TO DEADLINE

A Bidder wishing to withdraw a bid/proposal prior to the deadline may do so by preparing a formal written request on company letterhead. The person who signs the letter must be the same person who signs the reply sheets. The Town will verify that the signature on the letter matches the signature on the reply sheets.

The Town will also verify the request to withdraw the bid/proposal by calling the Bidder at the telephone number supplied on the reply sheets.

After the Town is satisfied that a request to withdraw a bid/proposal before the established deadline is valid, the bid/proposal will be returned to the Bidder. The Bidder may then withdraw completely from the bidding process, or may modify the bid/proposal and resubmit before the deadline.

WITHDRAWAL OF BIDS (OR PROPOSALS) AFTER THE DEADLINE

If bid security is required and a Bidder does not honor his/her bid for the specified time, the bid check shall become the property of the Town; or, if a Bid Bond was furnished, the Bid Bond shall become payable to the Town.

After the bid/proposal deadline has passed, the submitted bids/proposals become the property of the Town and are valid offers to be honored by the Bidder for sixty (60) days or longer, as specified in the Request for Bid/Proposal.

Bidders who do not honor their bids/proposals for the sixty (60) day (or as specified) period, shall be declared irresponsible Bidders.

BID SECURITY

Each bid must be accompanied by **an original Bid Bond with a raised seal** prepared on the form of Bid Bond attached hereto as **EXHIBIT D** duly executed and acknowledged by the Bidders, as principal, and by a surety company qualified to do business in the State of Connecticut and satisfactory to the Town, as surety.

The Bid Bond shall be 5% of the total lump sum of the bid and shall be enclosed in the sealed envelope containing the bid. Each Bid Bond may be held by the Town as security for the fulfillment of the Bidder's 'agreement' set forth on the bid Reply Sheets. Should the Bidder fail to fulfill such agreements the Bid Bond shall become payable to the Town, as liquidated damages, otherwise, the Bid Bond shall become null and void.

PERFORMANCE BOND

For bids or proposal greater than $100,000, the awarded Contractor will be required to furnish a Performance, Maintenance and Payment Bond on the Town of Greenwich form which follows in **Exhibit E** (attached) **in the amount of the Gross Sum of the contract**, including allowance for contingencies and extra work, and/or contract price within seven (7) days of the award. The bond must be duly executed and acknowledged by said Contractor as principal and by a surety company qualified to do business under the laws of the State of Connecticut and satisfactory to the Town, as surety, for the faithful performance of the contract and payment for labor and materials. The Contractor shall pay the premium for such bond. A letter from the bonding company, stating that the Performance Bond can be obtained within seven (7) days of request, should be provided with the bid.

For contracts that require a Performance, Maintenance and Payment Bond, the Contractor shall maintain all of the specified required insurance coverage and continue to document the specified required insurance coverage for one (1) year after completion of the work of the contract (or other such time as the contract or other agreement requires).

NON-CONNECTICUT CONTRACTORS

The Town of Greenwich is requiring that for construction bids at or above $200,000 the Nonresident Contractor must have obtained verified status from the Department of Revenue Services in the State of Connecticut and provide a copy of the letter of verification with the bid. A Bidder is a Nonresident Contractor if it does not maintain a regular place of business in

Connecticut. The Town's threshold of $200,000 is $50,000 lower than the State of Connecticut's threshold of $250,000 for the verification requirement.

The State of Connecticut Department of Revenue Services Special Notice, SN 2012(2) is included with this Request for Bid as **Exhibit F.** This document provides the full definition of "Nonresident Contractor" and describes the State of Connecticut's process for verification.
Any questions relating to the verification process can be directed to the phone numbers given under the heading "For Further Information" on page 4 of Special Notice SN 2012(2).
It is recommended that potential Bidders begin the State's verification process as soon as possible in order to have adequate time to receive the letter of verification and present it with their bid.

A bid at or over $200,000 from a Nonresident Contractor will not be considered responsive if the Contractor has not achieved verified status at the due date and time for the bid. The exception to this requirement shall be if there has been one Bidder only in a particular bid process or the Town determines that it is in its best interests to waive this requirement. In this case, the Town reserves the right to modify this requirement. However, any modification to this requirement shall be in compliance with the State of Connecticut Department of Revenue Services Special Notice, SN 2012(2).

If the Town waives the verification requirement for a Nonresident Contractor, the Town shall withhold 5% of all payments made to the Contractor to cover taxes due to the State of Connecticut. Payments withheld from the Nonresident Contractor may be released if proof of verification status in the form of a letter of verification is received. Payments withheld from the Nonresident Contractor may also be released to the Contractor if the Contractor has filed a surety bond, Form AU-964 **Exhibit G**, with the Department of Revenue Services in the amount equal to 5% of the total contract price including any change orders.

INSURANCE REQUIREMENTS

The **awarded** Vendor will be required to provide insurance coverage as specified on the Insurance Requirements Sheet, **Exhibit A**, of this RFB. The **Acord certificate of insurance form** must be executed by your insurance agent/broker and returned to this office. The most current Acord form should be used for insurance documentation purposes. Company name and address must conform on all documents including insurance documentation. It is required that the agent/broker note the individual insurance companies providing coverage, rather than the insurance group, on the Acord form. The Contract number (provided to the awarded Contractor), project name and a brief description must be inserted in the "Description of Operations" field. It must be confirmed on the Acord Form that the Town of Greenwich is endorsed as an additional insured by having the appropriate box checked off and stating such in the "Description of Operations" field. **Contractor's insurance must be primary and non-contributory.**

A letter from the awarded Vendor's agent/broker certifying that the Town of Greenwich has been endorsed onto the general liability policy as an additional insured is also mandatory. This letter shall be addressed to the Towns' Director of Purchasing and **must follow exactly the format of the letter attached as Exhibit B. It must be signed by the same authorized individual representative who signed the Acord form. Both the certificate of insurance and the letter must be signed by the same authorized representative.** If the

insurance coverage required is provided on more than one Acord certificate of insurance, then additional agent/broker letters are also required. Contract development will begin upon receipt of complete, correct insurance documentation.

The Contractor shall be responsible for maintaining the above insurance coverages in force to secure all of the Contractor's obligations under the Contract with an insurance company or companies with an AM Best Rating of A:VII or better, licensed to write such insurance in Connecticut and acceptable to the Risk Manager, Town of Greenwich. For excess liability only, non-admitted insurers are acceptable, provided they are permitted to do business through Connecticut excess line brokers per listing on the current list of Licensed Insurance Companies, Approved Reinsurers, Surplus Lines Insurers and Risk Retention Groups issued by the State of Connecticut Insurance Department.

The Vendor shall submit with the proposal the signed, original **"Insurance Procedure"** form, **page 19**, which states that the Vendor agrees to provide the specified insurance coverage for this proposal at no additional charge above any insurance charge declared in the bid.

PREVAILING WAGE RATES

Except as noted below, the Contractor shall comply with the current provisions of Section 31-53 of the General Statutes of the State of Connecticut, a part of which is quoted as follows.

> "The wages paid on an hourly basis to any person performing the work of any mechanic, laborer or worker on the work herein contracted to be done and the amount of payment or contribution paid or payable on behalf of each such person to any employee or welfare fund, as defined in subsection (h) of section 31-53 of the General Statutes, shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the town in which such public works project is being constructed. Any contractor who is not obligated by agreement to make payment or contribution on behalf of such persons to any such employee welfare fund shall pay to each mechanic, laborer or worker as part of such person's wages the amount of payment or contribution for such person's classification on each pay day."

All Contractors and Subcontractors shall submit certified weekly payrolls, on forms furnished by the Town, for all contracts meeting the aforementioned monetary limits. The certified payrolls shall be submitted with the Contractor's monthly certificate for payment. The wage schedule for this project is attached as **Exhibit H.**

Section 31-55a of the General Statutes of the State of Connecticut provides that the prevailing wage rates applicable to any awarded contract or subcontract are subject to annual adjustments each July 1st for the duration of the project.

Each Contractor that is awarded a contract shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the Contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's web site. The annual adjustments will be posted on the Departments of Labor web page: www.ctdol.state.ct.us. For those without Internet access, contact the division listed below.

The Contractor shall also furnish proof with the weekly certified payroll for the first week each employee begins work that any person performing the work of a mechanic, laborer or worker has completed a course of at least ten (10) hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration (OSHA) in accordance with Connecticut General Statutes Section 31-53b and regulations adopted by the State of Connecticut Labor Commissioner. The provisions of this section shall not apply where the total cost of all work to be performed by all Contractors and subcontractors in connection with new construction of any public works project is less than four hundred thousand dollars ($400,000) or where the total cost of all work to be performed by all Contractors and Subcontractors in connection with any remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project is less than one hundred thousand dollars ($100,000).

Questions can be directed to the Contract Compliance Unit, Wage and Workplace Standards Division, Connecticut Department of Labor, 200 Folly Brook Blvd., Wethersfield, CT 06109 at 860-263-6790.

BID SUBMITTAL

The following documentation must be submitted with the bid, otherwise the bid will be declared non-responsive:

- **Bid Bond (Ink signature and raised seal)**
- **Non-CT Contractors verification letter if company and address indicated in the Bidder's Company section is located outside of the State of CT**
- **Reply Sheets (pages 7-18)**
- **Insurance Procedure Form (page 19)**
- **Anti-Fracking Certification (page 20)**
- **Vendor Information and Signatory Form (pages 21-22)**

All bids must be signed in ink. Electronic signatures will not be accepted.

SPECIFICATIONS

Bid prices shall remain firm for 120 days after the deadline date (bid opening).

The Contractor shall furnish all labor, services, materials, equipment, plant, machinery, apparatus, appliances, tools, supplies and all other things necessary to do all work required for the completion of each item of the work and as herein specified.

All work will conform to all local and state building, health and fire codes.

The Contractor will use the attached drawings, **Exhibit I**, and the specifications to complete this project.

Complete specifications for this project are provided after the Reply Sheets, commencing with the Table of Contents on **page 23**.

TOWN OF GREENWICH, CT

REQUEST FOR BID #7527 DUE: 11/14/19 AT: 3:00PM

TOWN HALL PARKING GARAGE REHABILITATION

REPLY SHEETS (PAGE 1 of 12)

All bids must be signed in ink.

Bidder shall provide pricing below, as per the specifications of this RFB, on the following Reply Sheets. All pricing shall be complete and include all costs including, but not limited to, insurance, bonding, materials, supervision, labor, transportation, shipping, unloading, rigging, installation, delivery, etc. Delivery terms are FOB destination, freight prepaid and allowed. The Town reserves the right to award on a line-by-line basis or as a Lump Sum.

Required Pricing:

Phase I $_____

Phase II $_____

Phase III $_____

TOTAL LUMP SUM PRICE: $_____

Bidder's Company Name _____

Authorized Signature _____

TOWN OF GREENWICH, CT

REQUEST FOR BID #7527 DUE: 11/14/19 AT: 3:00PM

TOWN HALL PARKING GARAGE REHABILITATION

REPLY SHEETS (PAGE 2 of 12)

UNIT PRICES

Unit Prices shall be used, where applicable, to make adjustments to the cost of the Work of this Contract due to changes to the Work required by the Drawings and Specifications. ALL Unit Prices shall be complete in-place prices and include costs for all necessary material, delivery, installation, overhead and profit, and shall remain firm for the period of the contract. General Conditions, as required by the drawings and Divisions 0 and 1 of the specifications, shall NOT be included in Unit Prices. Examples of General Conditions include but are not limited to mobilization / demobilization, phasing, temporary facilities and controls, dust control, all applicable taxes (Federal, State, Municipal and/or local taxes), bonds, insurance and any other incidentals related to the completion of the Work. Unit Prices listed are for additions or deletions to the work and shall remain firm for the full duration of the contract.

Markups for General Conditions will be used in combination with the Unit Prices for additions or deletions to the work.

Unit Price Markup for General Conditions _____%

Unit Price No. 1 – Partial Depth Floor Repair (PFR):
1. Description: See repair detail on drawing sheet R4.1
Unit of Measurement: square foot

Unit Price = $ _____

Unit Price No. 2 – Shallow Depth Floor Repair (SFR):
1. Description: See repair detail on drawing sheet R4.2
Unit of Measurement: square foot

Unit Price = $ _____

Unit Price No. 3 – Full Depth Floor Repair (FFR):
1. Description: See repair detail on drawing sheet R4.2
Unit of Measurement: square foot

Unit Price = $ _____

Unit Price No. 4 – Overhead Surface Repair (OSR):
1. Description: See repair detail on drawing sheet R4.2
Unit of Measurement: square foot

Unit Price = $ _____

Unit Price No. 5 – Overhead Beam Repair (OBR):
1. Description: See repair detail on drawing sheet R4.2
Unit of Measurement: square foot

Unit Price = $ _____

Bidder's Company Name _____

Authorized Signature _____

TOWN OF GREENWICH, CT

REQUEST FOR BID #7527 DUE: 11/14/19 AT: 3:00PM

TOWN HALL PARKING GARAGE REHABILITATION

REPLY SHEETS (PAGE 3 of 12)

Unit Price No. 6 – Vertical Repair (VR):

2. Description: See repair detail on drawing sheet R4.1
Unit of Measurement: square foot

Unit Price = $ _____

Unit Price No. 7 – Vertical Repair – Exterior (VRE):

1. Description: See repair detail on drawing sheet R4.1 & R4.4
2. Unit of Measurement: linear foot

Unit Price = $ _____

Unit Price No. 8 – Column Repair (CR):

1. Description: See repair detail on drawing sheet R4.2
Unit of Measurement: square foot

Unit Price = $ _____

Unit Price No. 9 – Curb Repair (CR):

1. Description: See repair detail on drawing sheet R4.2
Unit of Measurement: square foot

Unit Price = $ _____

Unit Price No. 10 – Static Floor Crack Repair (FCS):

1. Description: See repair detail on drawing sheet R4.2
2. Unit of Measurement: linear foot

3. Unit Price = $ _____

Unit Price No. 11 – Epoxy Injection (EI):

1. Description: See repair detail on drawing sheet R4.1
2. Unit of Measurement: linear foot

Unit Price = $ _____

Unit Price No. 12 – Wet Epoxy Injection (EIW):

1. Description: See repair detail on drawing sheet R4.1
Unit of Measurement: linear foot

Unit Price = $ _____

Bidder's Company Name _____

Authorized Signature _____

Unit Price No. 13 – Sealant Replacement (SR):

1. Description: See repair detail on drawing sheet R4.1

Unit of Measurement: linear foot

Unit Price = $ _____

Unit Price No. 14 – Traffic Deck Coating Removal (TCR):

1. Description: See repair detail on drawing sheet R4.1

Unit of Measurement: square foot

Unit Price = $ _____

Unit Price No. 15 – Traffic Deck Coating Application (TCA)

1. Description: See repair detail on drawing sheet R4.1

Unit of Measurement: square foot

Unit Price = $ _____

Unit Price No. 16– Expansion Joint Replacement (EJ)

1. Description: See repair detail on drawing sheet R4.1

Unit of Measurement: linear foot

Unit Price = $ _____

Unit Price No. 17 – Vertical Sealant Replacement (VSR):

1. Description: See repair detail on drawing sheet R4.2

Unit of Measurement: linear foot

Unit Price = $ _____

Unit Price No. 18 – Supplemental Floor Drain (SFD):

1. Description: See repair detail on drawing sheet R4.1

Unit of Measurement: each

Unit Price = $ _____

Unit Price No. 19 – Replacement Floor Drain (RFD):

1. Description: See repair detail on drawing sheet R4.1

Unit of Measurement: each

Unit Price = $ _____

Bidder's Company Name _____

Authorized Signature _____

TOWN OF GREENWICH, CT

REQUEST FOR BID #7527 DUE: 11/14/19 AT: 3:00PM

TOWN HALL PARKING GARAGE REHABILITATION

REPLY SHEETS (PAGE 5 of 12)

Unit Price No. 20 – P/T Tendon Splice Repair (PTR):

1. Description: See repair detail on drawing sheet R4.3
2. Unit of Measurement: each

Unit Price = $ _____ / EA.

Unit Price No. 21 – Brick Repointing (BRP):

1. Description: See repair details on drawing sheet R4.2 and general note F/R0.1
2. Unit of Measurement: square foot

3. Unit Price = $ _____

Unit Price No. 22 – Brick Replacement (BR):

1. Description: See repair details on drawing sheet R4.2
2. Unit of Measurement: each

3. Unit Price = $ _____

Unit Price No. 23 – Edge of Slab Repair with P/T Stressing Coupler (ESR):

1. Description: See repair detail on drawing sheet R4.4
2. Unit of Measurement: linear foot

3. Unit Price = $ _____

Unit Price No. 24 – Edge of Slab Repair with P/T Stressing Anchorage Repair (ESR1):

1. Description: See repair detail on drawing sheet R4.4
2. Unit of Measurement: linear foot

3. Unit Price = $ _____

Unit Price No. 25 – P/T Tendon with Stressing Coupler Repair (ESR2):

1. Description: See repair detail on drawing sheet R4.4
2. Unit of Measurement: linear foot

3. Unit Price = $ _____

Unit Price No. 26 – P/T Tendon with Stressing Anchorage Repair (ESR3):

1. Description: See repair detail on drawing sheet R4.4
2. Unit of Measurement: linear foot

3. Unit Price = $ _____

Bidder's Company Name _____

Authorized Signature _____

Unit Price No. 27 – Stair Replacement (STR):

1. Description: See repair detail on drawing sheet R4.3
2. Unit of Measurement: each

3. Unit Price = $ _____

Unit Price No. 28 – Column Waterproofing (CW):

1. Description: See Vertical Membrane System per spec section 079020
2. Unit of Measurement: square foot

3. Unit Price = $ _____

Unit Price No. 29 – Additional Topping to Re-slope (ATR):

1. Description: See repair detail on drawing sheet R4.2
2. Unit of Measurement: square foot

3. Unit Price = $ _____

Unit Price No. 30 – Re-Level Accessible Route (RAR):

1. Description: See repair detail on drawing sheet R4.2
2. Unit of Measurement: lump sum

3. Unit Price = $ _____

Unit Price No. 31 – Guardrail Installation @ ADA Spaces (GRI):

1. Description: See repair detail on drawing sheet R4.2
2. Unit of Measurement: linear foot

3. Unit Price = $ _____

Unit Price No. 32 – Replacement Signage – ADA Spaces (RS):

1. Description: See repair detail on drawing sheet R4.3
2. Unit of Measurement: each

3. Unit Price = $ _____

Unit Price No. 33 – Stair Railing Replacement (SRR):

1. Description: See repair detail on drawing sheet R4.3
2. Unit of Measurement: each

3. Unit Price = $ _____

Bidder's Company Name _____

Authorized Signature _____

TOWN OF GREENWICH, CT

REQUEST FOR BID #7527 DUE: 11/14/19 AT: 3:00PM

TOWN HALL PARKING GARAGE REHABILITATION

REPLY SHEETS (PAGE 7 of 12)

Unit Price No. 34 – Pipe Replacement (PR):

1. Description: Replace corroded piping with new 4"Ø cast-iron pipe
2. Unit of Measurement: linear foot

3. Unit Price = $ _____

Unit Price No. 35 – Pavement Marking Re-Painting (PMR):

1. Description: Restripe parking stalls, traffic markings, and other existing marking after the application of concrete sealer and traffic membrane per spec section 321723.

Unit of Measurement: lump sum

Unit Price = $ _____

Unit Price No. 36 – Barrier Cable Replacement (BCR):

1. Description: See repair detail on drawing sheet R4.3
2. Unit of Measurement: each

3. Unit Price = $ _____

Unit Price No. 37 – Column Repair with Enlargement (CRE):

1. Description: See repair detail on drawing sheet R4.3
2. Unit of Measurement: square foot

3. Unit Price = $ _____

Unit Price No. 38 – Vehicular Barrier Replacement (VBR):

1. Description: Replace vehicular barrier to match existing
2. Unit of Measurement: each

3. Unit Price = $ _____

Unit Price No. 39 – Lump Sum Work Items (LSW):

1. Description: See lump sum work items on sheet R0.2
2. Unit of Measurement: lump sum

3. Unit Price = $ _____

Unit Price No. 40 – Interior Light Fixtures (ILF):

1. Description: Installation only of pendant-mounted light fixtures. See lighting notes on drawing sheet R0.2
2. Unit of Measurement: each

3. Unit Price = $ _____

Bidder's Company Name _____

Authorized Signature _____

Unit Price No. 41 – Exterior Light Fixtures (ELF):

1. Description: Installation only of pole-mounted light fixtures. See lighting notes on drawing sheet R0.2
2. Unit of Measurement: each
3. Unit Price = $ _____

Unit Price No. 42

1. Description: Material and labor for replacement of #3 to #11 straight reinforcing bars placed per Engineer's direction

Unit of Measurement: ponds

Unit Price = $ _____ / pound

Unit Price No. 43

1. Description: Material and labor for doweling reinforcing into existing concrete using Hilti HIT HY 200 Adhesive (not including reinforcing)

Unit of Measurement: each

#3 w/ 6" embedment - Add $ _____

#4 w/ 8" embedment - Add $ _____

#5 w/ 10 1/4" embedment - Add $ _____

#6 w/ 12 3/4" embedment - Add $ _____

#7 w/ 15" embedment - Add $ _____

#8 w/ 17 1/2" embedment - Add $ _____

#9 w/ 19" embedment - Add $ _____

#10 w/ 23" embedment - Add $ _____

#11 w/ 26" embedment - Add $ _____

Unit Price No. 44

1. Description: Material and labor for replacement of Welded Wire Reinforcing (W.W.R.) per Engineer's direction

Unit of Measurement: pounds

Unit Price = $ _____ / pound

Bidder's Company Name _____

Authorized Signature _____

TOWN OF GREENWICH, CT

REQUEST FOR BID #7527 DUE: 11/14/19 AT: 3:00PM

TOWN HALL PARKING GARAGE REHABILITATION

REPLY SHEETS (PAGE 9 of 12)

SCHEDULE

Identify the timeframe, in weeks, required for the execution of the following work:

Submit Shop Drawings _____ Weeks

Fabrication Time (from approved shop drawings incl. coordination) _____ Weeks

Estimate on Site Work Time _____ Weeks

Bidder's Company Name _____

Authorized Signature _____

TOWN OF GREENWICH, CT

REQUEST FOR BID #7527 DUE: 11/14/19 AT: 3:00PM

TOWN HALL PARKING GARAGE REHABILITATION

REPLY SHEETS (PAGE 10 of 12)

EXCEPTIONS

Bidder shall indicate below any exceptions to the specifications, language of this RFB document, and/or to the language of the attached Agreement Contract:

REFERENCES

Bidder shall list below the names and telephone numbers of five (5) customers/references for which they have provided services similar to the ones described in this RFB:

REFERENCE	CONTACT NAME	TELEPHONE #

Bidder shall list below all Subcontractors (if any) that will be used to work on this project:

SUBCONTRACTOR NAME	CITY, STATE	TYPE OF BUSINESS

Bidder's Company Name _____

Authorized Signature _____

TOWN OF GREENWICH, CT

REQUEST FOR BID #7527 DUE: 11/14/19 AT: 3:00PM

TOWN HALL PARKING GARAGE REHABILITATION

REPLY SHEETS (PAGE 11 of 12)

Non-collusion Language

In submitting this bid/proposal, the undersigned declares that this is made without any connection with any persons making another bid/proposal on the same contract; that the bid/proposal is in all respects fair and without collusion, fraud or mental reservation; and that no official of the Town, or any person in the employ of the Town, is directly or indirectly interested in said bid/proposal or in the supplies or work to which it relates, or in any portion of the profits thereof.

Compliance with Ethics Code

In submitting this bid, the undersigned further declares that it has not, and will not, induce or attempt to induce any Town of Greenwich employee or officer to violate the Greenwich Code of Ethics in connection with its offer to provide goods or services under, or otherwise in the performance of, such contract.

The undersigned further understands that the above declarations are material representations to the Town of Greenwich made as a condition to the acceptance of the bid/proposal. If found to be false, the Town of Greenwich retains the right to reject said bid/proposal and rescind any resulting contract and/or purchase order and notify the undersigned accordingly, thereby declaring as void said bid/proposal and contract or purchase order.

BIDDER'S COMPANY NAME _____

ADDRESS _____

_____

TELEPHONE # _____ **FAX #** _____

E-MAIL ADDRESS _____

WEB SITE _____

AUTHORIZED SIGNATURE _____

PRINT NAME _____

TITLE _____

STATE OF CT TAXPAYER ID # _____

FEDERAL TAXPAYER ID # _____

INCORPORATED IN THE STATE OF _____ **Corporate Seal** ☐ **Yes** ☐ **No**

NON- COLLUSION LANGUAGE CONTINUED

The Greenwich Code of Ethics can be found at www.greenwichct.org. Relevant provisions of the Code of Ethics state as follows:

2. DEFINITION. (1) Indirect interest, without limiting its generality, shall mean and include the interest of any Subcontractor in any prime contract with the Town and the interest of any person or his immediate family in any corporation, firm or partnership which has a direct or indirect interest in any transaction with the Town. (2) Substantial financial interest shall mean any financial interest, direct or indirect, which is more than nominal and which is not common to the interest of other citizens of the Town. (3) Town officer shall mean and include any official, employee, agent, consultant or member, elected or appointed, of any board, department, commission, committee, legislative body or other agency of the Town. (4) Transaction shall mean and include the offer, sale or furnishing of any real or personal property, material, supplies or services by any person, directly or indirectly, as Vendor, prime Contractor, Subcontractor or otherwise, for the use and benefit of the Town for a valuable consideration, excepting the services of any person as a Town officer.
3. GIFTS AND FAVORS. No Town officer or his immediate family shall accept any valuable gift, thing, favor, loan or promise which might tend to influence the performance or nonperformance of his official duties.
4. IMPROPER INFLUENCE. No Town officer having a substantial financial interest in any transaction with the Town or in any action to be taken by the Town shall use his office to exert his influence or to vote on such transaction or action.

By signing below, the undersigned declares that he/she has read the non-collusion language contained herein and agrees to abide by its contents:

AUTHORIZED SIGNATURE _____

PRINT NAME _____

BIDDER'S COMPANY NAME _____

CONTRACT SIGNATURE

The bidder shall indicate below, the full name, title, and the complete mailing address of the authorized person (i.e., **officer of the company**) who will sign the contract (if one is needed) for this procurement:

_____

_____

_____

_____

_____

TOWN OF GREENWICH, CT

INSURANCE PROCEDURE FORM

THE BIDDER SHALL RETURN THIS COMPLETED FORM WITH THE BID/PROPOSAL. FAILURE TO DO SO MAY RESULT IN REJECTION OF THE BID/PROPOSAL.

The Bidder shall take the Insurance Requirement Sheet (Exhibit A) to the Bidder's insurance agent/broker upon receipt of the bid documents. The Bidder and the agent/broker shall familiarize themselves with the required levels of insurance, and the documentation process necessary for the successful development of a contract with the Town of Greenwich, CT for this project.

The Bidder shall determine if existing insurance coverage is sufficient, or if any costs for new or additional coverage is required for the specified work noted in this Request for Bid/Proposal. Any bids/proposals which contain exceptions to the insurance requirements may be considered nonresponsive and may be rejected.

STATEMENT OF BIDDER AND BIDDER'S AGENT/BROKER:

We have read the insurance requirements for this project and confirm that we are willing and able to document the required levels of coverage as the Town of Greenwich, CT has specified. The bid pricing submitted reflects all insurance costs for this project.

If awarded this contract, the complete and correct insurance documentation shall be submitted to the Town of Greenwich, CT within ten (10) days after the date of the award of the contract.

Bidder's Company Name: _____

Authorized Bidder's Signature: _____

Date: _____

Bidder's Insurance Agent/Broker's Company Name: _____

Authorized Agent/Broker's Signature: _____

Date: _____

TOWN OF GREENWICH CONNECTICUT
CERTIFICATION FOR RFB's & RFP's
PROHIBITION OF WASTES GENERATED FROM OIL & GAS DRILLING AND EXTRACTION ACTIVITIES

Pursuant to Town of Greenwich, Chapter 15: Utilities, Town Code, Ordinance Prohibiting Waste Associated with Natural Gas and Oil Extraction:

"We, _____
hereby submit a bid for materials, equipment and/or labor for the Town of Greenwich. The bid is for bid documents titled

_____

We hereby represent, warrant and agree that no natural gas waste or oil waste will be used by the undersigned Bidder or any Contractor, Subcontractor, Agent or Vendor in connection with the bid; nor will the undersigned Bidder or any Contractor, Subcontractor, Agent or Vendor thereof apply any natural gas waste or oil waste to any road or real property within the Town of Greenwich as a result of the submittal of this bid if selected."

_____
Date

_____
Signed

_____
Print Name

_____
Company

_____
Address

Vendor Information & Signatory Form

Vendor Name: _____

Primary Business Address: _____

Telephone: _____ Fax: _____

Email: _____ Web Site: _____

Secondary Business Location(s)if any:

Business Address: _____

Telephone: _____ Fax: _____

Email: _____ Web Site: _____

Business Address: _____

Telephone: _____ Fax: _____

Email: _____ Web Site: _____

Type of Entity: Corporation: _____ Type of Corp.: _____ LLC: _____
Partnership: _____ Joint Venture: _____ Sole Proprietorship: _____
Other (please describe): _____

1. CT State Business License Number (if applicable): _____
   State Agency issuing license: _____
2. Number of years in business under entity name: _____
3. Provide below the full names of entity's owners (> 20% ownership), officers and managers. (use a separate sheet of paper if necessary)

   _____

   _____

   _____

   _____

4. Has the entity changed its name within the past 3 years?
   a. YES ☐ NO ☐
5. If yes, provide former name(s): _____
6. Have there been any recent (within the last three years) changes in control/ownership, > 20% of the entity?
   a. YES ☐ NO ☐
7. If yes, explain. (use a separate sheet of paper if necessary)
8. Have officers or principals of the entity ever had any license suspended or revoked (other than Driver's License) for any reason?
   a. YES ☐ NO ☐
9. If yes, please explain. (use a separate sheet of paper if necessary)
10. Is the entity or has the entity, or any of its principals, officers, members or owners ever been a party to or involved in any US civil, criminal, antitrust violation, regulatory action, settlements, lawsuit or other legal action involving the Town of Greenwich or any other municipality in the States of CT or NY related to the vendor's business activities?
    a. YES ☐ NO ☐

11. If the answer to question number 10 is 'yes', please explain below. (use a separate sheet of paper if necessary.)

_____

_____

_____

_____

12. Has any principal, officer, member or owner of the undersigned entity within the last three years been a principal, officer, member or owner of any entity that has filed for bankruptcy or been voluntarily or involuntarily dissolved?

a. YES ☐ NO ☐

13. Name and title of person completing / responsible for submission of this bid or contract and the responses to this questionnaire: _____

14. Telephone number and email address for person identified in questions #13:

Phone No.: _____ Email Address: _____

15. If requested by the Town during the solicitation process, the vendor hereby agrees to provide the Town with copies of the most recent three (3) years of Loss History Reports for all lines of insurance coverage from its insurance carrier (as named herein) for all contracts and RFPs/RFQs/RFBs equal to or in excess of $250,000.

a. YES ☐ NO ☐

Name of Insurance Carrier: _____

The loss history reports shall include claims data for all fifty US states; detail of each claim for the past three years for AL, GL, WC; and a summary page with the annual total claim amounts for the past three years for AL, GL, and WC.

16. Have any claims been made against the entity's performance bond? YES ☐ NO ☐

17. Please indicate whether your entity is currently debarred from doing business in the State of Connecticut or any other state.

a. YES ☐ List of States: _____ NO ☐

18. Please indicate whether your entity has ever been convicted of OSHA violations.

a. YES ☐ (Attach separate page(s) with explanation.) NO ☐

With regard to item No.17 and 18, the vendor understands and agrees that it has a continuing obligation to inform the Town of any OSHA violation and if it is debarred from doing business in the State of Connecticut or any other State after it has submitted this Vendor Information Form. The Vendor understands and agrees that its obligation to keep the Town informed of any change in status continues up to and including the time of award of the contract and if vendor is awarded the contract, its obligation shall continue during the entire duration of the contract.

19. Provide below an inventory list of all major equipment owned by the entity that would be used on this project:

_____

_____

_____

_____

_____

_____

20. Provide a complete list of the entity's current public customers located in the State of Connecticut:

CUSTOMER	ADDRESS	CONTRACT ANNUAL AMOUNT

FAILURE TO COMPLETE THIS FORM OR FAILURE TO PROVIDE THE NECESSARY BACK UP INFORMATION FOR ANY QUESTION ON THIS FORM MAY RESULT IN DISQUALIFICATION.

Signature _____ Date: _____

Print Name and Title _____

SECTION 000001 – TABLE OF CONTENTS

SECTION 000002 – DRAWING LIST

RESTORATION

	Drawing Index	Exhibit I
R0.1	General Notes	Exhibit I
R0.2	Scope of Work	Exhibit I
R1.1	Phase I Top Level Restoration Plan	Exhibit I
R1.2	Phase I Middle Level Restoration Plan	Exhibit I
R2.1	Phase II Top Level Restoration Plan	Exhibit I
R2.2	Phase II Middle Level Restoration Plan	Exhibit I
R2.3	Phase II Bottom Level Restoration Plan	Exhibit I
R3.1	Phase III Top Level Restoration Plan	Exhibit I
R3.2	Phase III Middle Level Restoration Plan	Exhibit I
R3.3	Phase III Bottom Level Restoration Plan	Exhibit I
R4.1	Repair Details	Exhibit I
R4.2	Repair Details	Exhibit I
R4.3	Repair Details	Exhibit I
R4.4	Repair Details	Exhibit I

SECTION 011000 - SUMMARY

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:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work under separate contracts.
5. Access to site.
6. Coordination with occupants.
7. Work restrictions.
8. Specification and Drawing conventions.

B. Related Requirements:

1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: Greenwich Town Hall Parking Garage Restoration

B. Project Location: 101 Field Point Road, Greenwich, CT

C. Owner:
Town of Greenwich
101 Field Point Road
Greenwich, CT 06830
Contact: Blaize Levitan

D. Architect:
Timothy Haahs & Associates, Inc.
144 Livingston Avenue
New Brunswick, NJ 08901
Contact: Jordan Rappin, PE

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and in general consists of the following:

1. The Work includes restoration of a 30+/- year old, cast-in-place/post-tensioned parking garage. The Work includes concrete repairs; post-tensioning repairs; waterproofing repairs/replacement; ADA upgrades and other Work indicated in the Contract Documents.

1.5 PHASED CONSTRUCTION

A. The Work shall be conducted in phases to maximize Owner's use of the facility throughout the repairs, with each phase substantially complete before beginning the next phase.

B. Contractor shall occupy no more space than permitted by paragraph 1.8 "Work Restrictions" during any given phase of the project unless separate approval is provided, in writing, by Owner. The number of spaces allowed for Contractor occupancy may need to be modified during the repair process to suit Owner requirements as the repair program progresses.

C. Before commencing Work of each phase, submit a schedule showing the sequence, commencement and completion dates, inform Owner at least 72 hours in advance of any discrepancies so they may inform their personnel prior to occupying any portions of the completed work.

1.6 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Owner Occupancy: Allow for Owner occupancy of Project site and use by the public.
2. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, garage patrons, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

    a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.7 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site and existing building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.8 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:30 a.m. to 5 p.m., Monday through Friday, unless otherwise indicated.

1. Weekend Hours: As allowed by local jurisdiction.
2. Evening & Early Morning Hours: As allowed by local jurisdiction.
3. Hours for Utility Shutdowns: As allowed by Owner provided there is at least seven days' notice provided to Owner.
4. Hours for Core Drilling, or other Noisy & Vibration type activities: As allowed by local jurisdiction.

C. Stair towers must remain in service and be accessible at all times, unless an alternate means of egress plan is submitted to and approved by the Authority Having Jurisdiction.

D. The Contractors may take a maximum of 40 parking spaces out of service during business hours, however night and weekend work is preferred.

E. Work at entry and exit lanes and other high-volume areas must be completed during weekends and returned to service by 6:00 AM on weekdays.

F. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than seven days in advance of proposed utility interruptions.

2. Obtain Owner's written permission before proceeding with utility interruptions.

G. Contractor shall provide enclosures for each work area and provide ventilation and filtration equipment as needed to maintain a dust-free environment outside of the work areas in the Owner Occupied portions of the facility.

H. Restricted Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

I. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

J. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

1. Maintain list of approved screened personnel with Owner's representative.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Contingency allowances.

C. Related Sections include the following:

1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.
2. Division 1 Section "Unit Prices" for procedures for using unit prices.

1.3 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.4 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.5 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance at unit-cost.

B. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES

A. A list of unit prices is included on the Reply Sheets.

END OF SECTION 012100

SECTION 012700 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for unit prices.

B. Related Sections include the following:

1. Division 1 Section "Quality Requirements" for general testing and inspecting requirements.

1.3 DEFINITIONS

A. Unit price is an amount proposed by Bidders, stated on the Reply Sheet, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

A. Refer to Reply Sheets for a listing of Unit Prices.

END OF SECTION 012700

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections include the following:

1. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule. Cost-loaded CPM Schedule may serve to satisfy requirements for the Schedule of Values.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
   a. Application for Payment forms with Continuation Sheets.
   b. Submittals Schedule.
   c. Contractor's Construction Schedule.

2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:

a. Project name and location.
b. Name of Architect.
c. Architect's project number.
d. Contractor's name and address.
e. Date of submittal.

2. Submit draft of AIA Document G703 Continuation Sheets.
3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value.
      1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.

7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: Progress payments shall be submitted to Architect by the 21st of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Products list.
5. Schedule of unit prices.
6. Submittals Schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
11. Initial progress report.
12. Report of preconstruction conference.

13. Certificates of insurance and insurance policies.

H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. Evidence that claims have been settled.
7. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
8. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. Coordination Drawings.
   2. Administrative and supervisory personnel.
   3. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.

C. Related Sections include the following:
   1. Division 1 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
   2. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

A. Coordination: Contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.
   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components to ensure maximum accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.
   4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
   1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts

and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.4 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
   a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
   b. Indicate required installation sequences.
   c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
2. Sheet Size: At least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
3. Number of Copies: Submit two opaque copies of each submittal. Architect will return one copy.
   a. Submit five copies where Coordination Drawings are required for operation and maintenance manuals. Architect will retain one copy; remainder will be returned.
4. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.

1.5 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.

2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:
    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Procedures for processing field decisions and Change Orders.
    f. Procedures for requests for interpretations (RFIs).
    g. Procedures for testing and inspecting.
    h. Procedures for processing Applications for Payment.
    i. Distribution of the Contract Documents.
    j. Submittal procedures.
    k. Preparation of Record Documents.
    l. Use of the premises.
    m. Work restrictions.
    n. Owner's occupancy requirements.
    o. Responsibility for temporary facilities and controls.
    p. Construction waste management and recycling.
    q. Parking availability.
    r. Office, work, and storage areas.
    s. Equipment deliveries and priorities.
    t. First aid.
    u. Security.
    v. Progress cleaning.
    w. Working hours.
3. Minutes: Record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    a. The Contract Documents.
    b. Options.
    c. Related requests for interpretations (RFIs).

d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility problems.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written recommendations.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at regular intervals. Coordinate dates of meetings with preparation of payment requests.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
   a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      1) Review schedule for next period.
   b. Review present and future needs of each entity present, including the following:
      1) Interface requirements.
      2) Sequence of operations.
      3) Status of submittals.

4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Status of correction of deficient items.
14) Field observations.
15) Requests for interpretations (RFIs).
16) Status of proposal requests.
17) Pending changes.
18) Status of Change Orders.
19) Pending claims and disputes.
20) Documentation of information for payment requests.

3. Minutes: Record the meeting minutes.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
   a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

E. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
   1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
   2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
      a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
      c. Review present and future needs of each contractor present, including the following:
         1) Interface requirements.
         2) Sequence of operations.
         3) Status of submittals.
         4) Deliveries.

5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Change Orders.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Preliminary Construction Schedule.
   2. Contractor's Construction Schedule.
   3. Submittals Schedule.
   4. Field condition reports.
   5. Special reports.

B. Related Sections include the following:
   1. Division 1 Section "Payment Procedures" for submitting the Schedule of Values.
   2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
   3. Division 1 Section "Submittal Procedures" for submitting schedules and reports.
   4. Division 1 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 SUBMITTALS

A. Qualification Data: For scheduling consultant.

B. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
   1. Scheduled date for first submittal.
   2. Specification Section number and title.
   3. Submittal category (action or informational).
   4. Name of subcontractor.
   5. Description of the Work covered.
   6. Scheduled date for Architect's final release or approval.

C. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
   1. Submit an electronic copy of schedule, using Microsoft Project 2003 version. Include type of schedule (Initial or Updated) and date.

D. Field Condition Reports: Submit two copies at time of discovery of differing conditions.

E. Special Reports: Submit two copies at time of unusual event.

1.4 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to the Preliminary Construction Schedule and Contractor's Construction Schedule, including, but not limited to, the following:
   1. Review software limitations and content and format for reports.
   2. Verify availability of qualified personnel needed to develop and update schedule.
   3. Discuss constraints, including phasing work stages area separations interim milestones and partial Owner occupancy.
   4. Review delivery dates for Owner-furnished products.
   5. Review schedule for work of Owner's separate contracts.
   6. Review time required for review of submittals and resubmittals.
   7. Review requirements for tests and inspections by independent testing and inspecting agencies.
   8. Review time required for completion and startup procedures.
   9. Review and finalize list of construction activities to be included in schedule.
   10. Review submittal requirements and procedures.
   11. Review procedures for updating schedule.

1.5 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from parties involved.
   2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
   1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
   2. Initial Submittal: Submit concurrently with preliminary bar-chart schedule. Include submittals required during the first 30 days of construction. List those required to

maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."

B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 30 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
4. Startup and Testing Time: Include not less than 14 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 1 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
4. Work Restrictions: Show the effect of the following items on the schedule:
   a. Coordination with existing construction.
   b. Limitations of continued occupancies.
   c. Uninterruptible services.
   d. Partial occupancy before Substantial Completion.
   e. Use of premises restrictions.
   f. Provisions for future construction.
   g. Seasonal variations.
   h. Environmental control.
5. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
   a. Subcontract awards.

b. Submittals.
c. Purchases.
d. Mockups.
e. Fabrication.
f. Sample testing.
g. Deliveries.
h. Installation.
i. Tests and inspections.
j. Adjusting.
k. Curing.
l. Startup and placement into final use and operation.

6. Area Separations: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
   a. Structural completion.
   b. Permanent space enclosure.
   c. Completion of mechanical installation.
   d. Completion of electrical installation.
   e. Substantial Completion.

E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

F. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 14 days of date established for commencement of the Work. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
   1. For construction activities that require 3 months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.4 REPORTS

A. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation on CSI Form 13.2A. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
   1. 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.
   2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
   3. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
   1. Post copies in Project meeting rooms and temporary field offices.
   2. 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.

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Sections include the following:
   1. Division 1 Section "Quality Requirements" for submitting test and inspection reports.
   2. Division 1 Section "Closeout Procedures" for submitting warranties.
   3. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
   4. Divisions 3 through 32 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Engineer's responsive action.

B. Informational Submittals: Written information that does not require Engineer's responsive action.

1.4 SUBMITTAL PROCEDURES

A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Engineer for Contractor's use in preparing submittals.

B. 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. 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.

C. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

D. Processing Time: Allow enough 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. Initial Review: Allow 10 working days for initial 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. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
   3. Resubmittal Review: Allow 10 working days for review of each resubmittal.

E. Identification: Place a permanent label or title block on each submittal 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 on label for processing and recording action taken:
      a. Project name.
      b. Date.
      c. Name and address of Engineer.
      d. Name and address of Contractor.
      e. Name and address of subcontractor.
      f. Name and address of supplier.
      g. Name of manufacturer.
      h. Submittal number or other unique identifier, including revision identifier.
         1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
      i. Number and title of appropriate Specification Section.
      j. Drawing number and detail references, as appropriate.
      k. Location(s) where product is to be installed, as appropriate.
      l. Other necessary identification.

F. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

G. Additional Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
   1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Engineer.
   2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will return submittals, without review, received from sources other than Contractor.

1. Transmittal Form: Use one of AIA Document G810 or CSI Form 12.1A.
2. Transmittal Form: Provide locations on form for the following information:
   a. Project name.
   b. Date.
   c. Destination (To:).
   d. Source (From:).
   e. Names of subcontractor, manufacturer, and supplier.
   f. Category and type of submittal.
   g. Submittal purpose and description.
   h. Specification Section number and title.
   i. Drawing number and detail references, as appropriate.
   j. Transmittal number, numbered consecutively.
   k. Submittal and transmittal distribution record.
   l. Remarks.
   m. Signature of transmitter.
3. 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 label information as related submittal.

I. 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.
   3. Resubmit submittals until they are marked "Make Correction Note" or "Approved" from Engineer action stamp.

J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

K. Use for Construction: Use only final submittals with mark indicating "Make Correction Note" or "Approved" from Engineer action stamp.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.
   1. Submit electronic submittals directly to extranet specifically established for Project.

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 printed 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. Include the following information, as applicable:
      a. Manufacturer's written recommendations.

b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Standard color charts.
e. Manufacturer's catalog cuts.
f. Wiring diagrams showing factory-installed wiring.
g. Printed performance curves.
h. Operational range diagrams.
i. Mill reports.
j. Standard product operation and maintenance manuals.
k. Compliance with specified referenced standards.
l. Testing by recognized testing agency.
m. Application of testing agency labels and seals.
n. Notation of coordination requirements.

4. Submit Product Data before or concurrent with Samples.
5. Number of Copies: Submit three copies of Product Data, unless otherwise indicated. Engineer will return two copies. Mark up and retain one returned copy as a Project Record Document.

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. Dimensions.
   b. Identification of products.
   c. Fabrication and installation drawings.
   d. Roughing-in and setting diagrams.
   e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
   f. Shopwork manufacturing instructions.
   g. Templates and patterns.
   h. Schedules.
   i. Design calculations.
   j. Compliance with specified standards.
   k. Notation of coordination requirements.
   l. Notation of dimensions established by field measurement.
   m. Relationship to adjoining construction clearly indicated.
   n. Seal and signature of professional engineer if specified.
   o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
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 40 inches.
3. Number of Copies: Submit two opaque (bond) copies of each submittal. Engineer will return one copy.
4. Number of Copies: Submit three opaque copies of each submittal, unless copies are required for operation and maintenance manuals. Submit five copies where copies are required for operation and maintenance manuals. Engineer will retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.

D. Samples: Submit Samples for review 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 appropriate Specification Section.
   3. 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.
   4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
      a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.
   5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
      a. Number of Samples: Submit three sets of Samples. Engineer will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.
         1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
         2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule or List: 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.
   2. Number and name of room or space.
   3. Location within room or space.
   4. Number of Copies: Submit three copies of product schedule or list, unless otherwise indicated. Engineer will return two copies.
      a. Mark up and retain one returned copy as a Project Record Document.

F. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation" for Construction Manager's action.

G. Submittals Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

H. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."

I. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."

J. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:
   1. Name, address, and telephone number of entity performing subcontract or supplying products.
   2. Number and title of related Specification Section(s) covered by subcontract.
   3. Drawing number and detail references, as appropriate, covered by subcontract.
   4. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated. Engineer will return two copies. Mark up and retain one returned copy as a Project Record Document.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.
   1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Engineer will not return copies.
   2. Certificates and Certifications: Provide a notarized 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.
   3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."

B. Coordination Drawings: Comply with requirements specified in Division 1 Section "Project Management and Coordination."

C. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

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

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare 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.

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

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

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

J. Material Test Reports: Prepare 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.

K. Product Test Reports: Prepare written reports indicating 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.

L. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
   1. Name of evaluation organization.
   2. Date of evaluation.
   3. Time period when report is in effect.
   4. Product and manufacturers' names.
   5. Description of product.
   6. Test procedures and results.
   7. Limitations of use.

M. Schedule of Tests and Inspections: Comply with requirements specified in Division 1 Section "Quality Requirements."

N. Preconstruction Test Reports: Prepare 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.

O. Compatibility Test Reports: Prepare 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.

P. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, 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.

Q. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment.

R. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

S. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

T. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

U. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

V. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Engineer.

W. Contractors Means and Methods: Design, preparation, review, and installation of shoring, sheeting, bracing, etc. required to achieve the final repair as indicated on the restoration documents. All means & methods are deemed the full responsibility of the Contractor.

2.3 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
   1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. 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.

B. 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.

3.2 ENGINEER'S ACTION

A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.

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

   1. APPROVED (APP): Submittal is approved as is, proceed with work without any exception.
   2. MAKE CORRECTIONS NOTED (MCN): Submittal is approved with some revisions, proceed with work with caution and make correction(s) as noted, revise and resubmit corrected submittal for record.
   3. REVISE AND RESUBMIT (R&R): Submittal is not approved and must be revised and resubmitted for approval, do not proceed with work.
   4. REJECTED (REJ): Submittal is rejected outright without further review and a new submittal is required, do not proceed with work.

C. Informational Submittals: Engineer will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
   1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
   2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
   3. Requirements for Contractor to provide quality-assurance and -control services required by Engineer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections include the following:
   1. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
   2. Divisions 3 through 32 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Engineer.

C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing,

or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.

D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.

E. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

G. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

H. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

J. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
   1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

K. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Engineer for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.

1.5 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
   1. Specification Section number and title.
   2. Description of test and inspection.
   3. Identification of applicable standards.
   4. Identification of test and inspection methods.
   5. Number of tests and inspections required.
   6. Time schedule or time span for tests and inspections.
   7. Entity responsible for performing tests and inspections.
   8. Requirements for obtaining samples.
   9. Unique characteristics of each quality-control service.

C. Reports: Prepare and submit certified written reports that include the following:
   1. Date of issue.
   2. Project title and number.
   3. Name, address, and telephone number of testing agency.
   4. Dates and locations of samples and tests or inspections.
   5. Names of individuals making tests and inspections.
   6. Description of the Work and test and inspection method.
   7. Identification of product and Specification Section.
   8. Complete test or inspection data.
   9. Test and inspection results and an interpretation of test results.
   10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
   11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
   12. Name and signature of laboratory inspector.
   13. Recommendations on retesting and re-inspecting.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of New Jersey and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
   1. Requirement for specialists shall not supersede building codes and regulations governing the Work.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
   1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
   2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
   1. Contractor responsibilities include the following:
      a. Provide test specimens representative of proposed products and construction.
      b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
      c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
      d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
      e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
      f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
   2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Engineer with copy to Contractor.

Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
   1. Build mockups in location and of size indicated or, if not indicated, as directed by Engineer.
   2. Notify Engineer seven days in advance of dates and times when mockups will be constructed.
   3. Demonstrate the proposed range of aesthetic effects and workmanship.
   4. Obtain Engineer's approval of mockups before starting work, fabrication, or construction.
      a. Allow seven days for initial review and each re-review of each mockup.
   5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   6. Demolish and remove mockups when directed, unless otherwise indicated.

K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 2 through 9.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
   1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
   2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
   3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
   1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
      a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
   2. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
   3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
   4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
   5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section "Submittal Procedures."

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Notify Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
   3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
   4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
   5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
   6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
   1. Access to the Work.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
   4. Facilities for storage and field curing of test samples.
   5. Delivery of samples to testing agencies.
   6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
   7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 15 days of date established for the Notice to Proceed.
   1. Distribution: Distribute schedule to Owner, Engineer, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
   1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
   2. Notifying Engineer and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
   3. Submitting a certified written report of each test, inspection, and similar quality-control service to Engineer with copy to Contractor and to authorities having jurisdiction.
   4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
   5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
   6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:
   1. Date test or inspection was conducted.
   2. Description of the Work tested or inspected.
   3. Date test or inspection results were transmitted to Engineer.
   4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Engineer's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
   2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Sections include the following:

1. Division 1 Section "Summary" for limitations on utility interruptions and other work restrictions.
2. Division 1 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
3. Division 1 Section "Execution Requirements" for progress cleaning requirements.
4. Divisions 3 through 32 Sections for other requirements as may be necessary.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Pay sewer service use charges for sewer usage by all entities for construction operations. Contractor shall provide their own Port-A-John on the project site as directed by Owner. Contractor shall be responsible for routinely cleaning Port-A-John throughout the Work.

C. Water Service: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

D. Electric Power Service: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.5 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.6 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.7 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.

B. Portable Chain-Link Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized steel bases for supporting posts.

C. Wood Enclosure Fence: Plywood, 6 feet high, framed with four 2-by-4-inch rails, with preservative-treated wood posts spaced not more than 8 feet apart.

D. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.

E. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

F. Paint: Comply with requirements in Division 9 painting Sections.

2.2 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

1. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations and for protecting installed construction from adverse effects of high humidity. Additionally, provide temporary ventilation for maintaining work area in a dust-free environment, refer to Division 1 Section "Summary". Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

E. Project Identification and Temporary Signs: Provide Project identification and other signs. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted. Project identification signage shall include Owner's and Architect's logo prominently displayed.

1. Provide temporary, directional signs for construction personnel and visitors.
2. Maintain and touchup signs so they are legible at all times.

F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

H. Existing Elevator Use: Use of Owner's existing elevators will be permitted, as long as elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

1. Do not load elevators beyond their rated weight capacity.
2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

I. Existing Stair Usage: Use of Owner's existing stairs will be permitted, as long as stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If, despite such protection, stairs become damaged, restore damaged areas so no evidence remains of correction work.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
1. Comply with work restrictions specified in Division 1 Section "Summary."

B. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

C. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

D. Site Enclosure Fence: Before construction operations begin, furnish and install enclosure fence around work areas in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: Limit fencing to work areas and assure work phasing requirements are met per Division 1 Section "Summary".
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.

E. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

F. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, dust, odor, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

H. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from dust and fumes.

1. Construct dustproof partitions with 2 layers of 3-mil polyethylene sheet on each side. Cover floor with 2 layers of 3-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant plywood.
   a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.
2. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
3. Protect air-handling equipment.
4. Weather strip openings.
5. Provide walk-off mats at each entrance through temporary partition.

I. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Prohibit smoking in construction areas at the project site.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.

D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 1 Section "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. Related Sections include the following:
   1. Division 1 Section "Closeout Procedures" for submitting warranties for Contract closeout.
   2. Divisions 3 through 32 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
   2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
   3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.4 SUBMITTALS

A. Product List: Submit a list, in tabular from, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
   1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
   2. Form: Tabulate information for each product under the following column headings:
      a. Specification Section number and title.
      b. Generic name used in the Contract Documents.
      c. Proprietary name, model number, and similar designations.
      d. Manufacturer's name and address.
      e. Supplier's name and address.
      f. Installer's name and address.
      g. Projected delivery date or time span of delivery period.
      h. Identification of items that require early submittal approval for scheduled delivery date.
   3. Initial Submittal: Within 15 days after date of commencement of the Work, submit 3 copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.
      a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.
   4. Completed List: Within 45 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
   5. Engineer's Action: Engineer will respond in writing to Contractor within 15 days of receipt of completed product list. Engineer's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Engineer's response, or lack of response, does not constitute a waiver of requirement to comply with the Contract Documents.

B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Substitution Request Form: Use CSI Form 13.1A.
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
      a. Statement indicating why specified material or product cannot be provided.
      b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
      c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
      d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
      e. Samples, where applicable or requested.
      f. List of similar installations for completed projects with project names and addresses and names and addresses of Engineers and owners.

g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
j. Cost information, including a proposal of change, if any, in the Contract Sum.
k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Engineer will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
   a. Form of Acceptance: Change Order.
   b. Use product specified if Engineer cannot make a decision on use of a proposed substitution within time allocated.

C. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Engineer will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
      a. Form of Approval: As specified in Division 1 Section "Submittal Procedures."
      b. Use product specified if Engineer cannot make a decision on use of a comparable product request within time allocated.

D. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
   1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
   2. If a dispute arises between contractors over concurrently selectable but incompatible products, Engineer will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:
   1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
   2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
   3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
   4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:
   1. Store products to allow for inspection and measurement of quantity or counting of units.
   2. Store materials in a manner that will not endanger Project structure.
   3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
   4. Store cementitious products and materials on elevated platforms.
   5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
   6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
   7. Protect stored products from damage and liquids from freezing.
   8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
   1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
   2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
   1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
   2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.

3. Refer to Divisions 3 through 9 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
   4. Where products are accompanied by the term "as selected," Engineer will make selection.
   5. Where products are accompanied by the term "match sample," sample to be matched is Engineer's.
   6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
   7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:
   1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
   2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
   3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
   4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
   5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
   6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
   7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.

8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Engineer's sample. Engineer's decision will be final on whether a proposed product matches.
    a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Engineer will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
    b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Engineer will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Engineer will consider requests for substitution if received within 15 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Engineer.

B. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:
    1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
    2. Requested substitution does not require extensive revisions to the Contract Documents.
    3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    4. Substitution request is fully documented and properly submitted.
    5. Requested substitution will not adversely affect Contractor's Construction Schedule.
    6. Requested substitution has received necessary approvals of authorities having jurisdiction.
    7. Requested substitution is compatible with other portions of the Work.
    8. Requested substitution has been coordinated with other portions of the Work.
    9. Requested substitution provides specified warranty.

10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

2.3 COMPARABLE PRODUCTS

A. Conditions: Engineer will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:
   1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
   2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   3. Evidence that proposed product provides specified warranty.
   4. List of similar installations for completed projects with project names and addresses and names and addresses of Engineers and owners, if requested.
   5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017000 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. General installation of products.
3. Progress cleaning.
4. Starting and adjusting.
5. Protection of installed construction.
6. Correction of the Work.

B. Related Sections include the following:

1. Division 1 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
2. Division 1 Section "Submittal Procedures" for submitting surveys.
3. Division 1 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
4. Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

    a. Description of the Work.
    b. List of detrimental conditions, including substrates.
    c. List of unacceptable installation tolerances.
    d. Recommended corrections.

2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include

a detailed description of problem encountered, together with recommendations for changing the Contract Documents. Submit requests on CSI Form 13.2A, "Request for Interpretation."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Engineer.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017000

SECTION 017310 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:

1. Divisions 3 through 32 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.

7. Engineer's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Mechanical systems piping and ducts.
4. Control systems.
5. Communication systems.
6. Conveying systems.
7. Electrical wiring systems.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain-wall construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.
6. Noise- and vibration-control elements and systems.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, etc. following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

    a. Clean piping, conduit, etc. before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until blended with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight and dust-free condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017310

SECTION 017320 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.

B. Related Sections include the following:

1. Division 1 Section "Summary" for use of premises, and phasing, and Owner-occupancy requirements.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 SUBMITTALS

A. Qualification Data: For demolition firm and professional engineer.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's and other tenants' on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Locations of proposed dust- and noise-control temporary partitions and means of egress, including for other tenants affected by selective demolition operations.

6. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
7. Means of protection for items to remain and items in path of waste removal from building.

C. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

D. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

E. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1. Comply with submittal requirements in Division 1 Section "Construction Waste Management."

1.5 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

D. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.6 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

1. Comply with requirements specified in Division 1 Section "Summary."

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before selective demolition, Owner will remove the following items:

a. Vehicles / Buses

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is unknown whether hazardous materials will be encountered in the Work.

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service & Mechanical / Electrical Equipment: Maintain existing utilities and mechanical / electrical equipment and protect them against damage during selective demolition operations. Review all utility services and mechanical / electrical equipment that is within the Limits of Work prior to submitting a bid. Include in the base bid all costs associated with the relocation and/or temporary shutdown of utility services and mechanical / electrical equipment that must be completed in order to complete the Work. Notify Owner, Operator, Architect and Amtrak of the required relocation(s) and/or temporary shutdown(s). Proceed with this Work upon receiving approval.

1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

F. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs.

1. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems that do not prevent the completion of the Work and protect them against damage during selective demolition operations.

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems as required to complete the Work.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off indicated utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

B. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Protect items from damage during transport and storage.
3. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Refer to Division 3 Section "Concrete Rehabilitation."

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.8 SELECTIVE DEMOLITION SCHEDULE

A. Existing Items to Be Removed: Concrete, asphalt, deck coating, etc. as defined in the Contract Documents.

B. Existing Items to Be Removed and Reinstalled: Utility services and mechanical / electrical equipment that must be relocated or removed and reinstalled in order to complete the Work.

C. Existing Items to Remain: Utility services and mechanical / electrical equipment that do not prevent the completion of the Work.

END OF SECTION 017320

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

B. Related Sections include the following:

1. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
2. Divisions 3 through 32 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
6. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
7. Advise Owner of changeover in heat and other utilities.
8. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
9. Complete final cleaning requirements, including touchup painting.

10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to General Conditions.
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final; continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

a. Project name.
b. Date.
c. Name of Architect.
d. Name of Contractor.
e. Page number.

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Remove snow and ice to provide safe access to building.
   f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   h. Sweep concrete floors broom clean in unoccupied spaces.
   i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
   j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
   k. Remove labels that are not permanent.
   l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

      1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

   m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
   n. Replace parts subject to unusual operating conditions.
   o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
   p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
   q. Clean ducts, blowers, and coils if units were operated without filters during construction.
   r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and

defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

s. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

SECTION 017810 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Sections include the following:

1. Division 1 Section "Closeout Procedures" for general closeout procedures.
2. Divisions 3 through 32 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up Record Prints.
2. Number of Copies: Submit copies of Record Drawings as follows:

a. Initial Submittal: Submit one set(s) of marked-up Record Prints. Engineer will initial and date each plot and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Engineer will return plots and prints for organizing into sets, printing, binding, and final submittal.
b. Final Submittal: Submit one set(s) of marked-up Record Prints, one set(s) of Record Transparencies, and three copies printed from Record Transparencies. Print each Drawing, whether or not changes and additional information were recorded.

1) Electronic Media: CD-R.

B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one copy of each Product Data submittal.

1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an understandable drawing technique.
    c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations below first floor.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.
    j. Changes made by Change Order or Construction Change Directive.
    k. Changes made following Engineer's written orders.
    l. Details not on the original Contract Drawings.
    m. Field records for variable and concealed conditions.
    n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Transparencies: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Engineer. When authorized, prepare a full set of corrected transparencies of the Contract Drawings and Shop Drawings.

1. Incorporate changes and additional information previously marked on Record Prints. Erase, redraw, and add details and notations where applicable.
2. Refer instances of uncertainty to Engineer for resolution.
3. Owner will furnish Contractor one set of transparencies of the Contract Drawings for use in recording information.
4. Print the Contract Drawings and Shop Drawings for use as Record Transparencies. Engineer will make the Contract Drawings available to Contractor's print shop.

C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Engineer determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult Engineer for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

D. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Record Transparencies: Organize into unbound sets matching Record Prints. Place transparencies in durable tube-type drawing containers with end caps. Mark end cap of each container with identification. If container does not include a complete set, identify Drawings included.
3. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Engineer.
    e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.

3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Engineer's reference during normal working hours.

END OF SECTION 017810

SECTION 017820 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Maintenance manuals for the care and maintenance of products, materials, finishes, systems and equipment.

B. Related Sections include the following:

1. Division 1 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Division 1 Section "Closeout Procedures" for submitting operation and maintenance manuals.
3. Division 1 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
4. Divisions 3 through 32 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

A. Initial Submittal: Submit 2 draft copies of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.

B. Final Submittal: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.

1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

1.5 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.

2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

    a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared Record Drawings in Division 1 Section "Project Record Documents."

E. Comply with Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017820

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
   1. Concrete repair > 3" in depth
   2. Suspended slabs.
   3. Stairs

B. Related Sections include the following:

   1. Division 3 Section "Unbonded Post-Tensioned System" for cast-in-place, unbonded post-tensioned concrete.
   2. Division 3 Section "Concrete Rehabilitation" for concrete repairs.
   3. Division 7 Section "Garage Waterproofing Systems" for waterproofing applied to cast-in-place concrete.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

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

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

   1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1.5 INFORMATION SUBMITTALS

A. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and installing and removing reshoring.

B. Samples: For waterstops and vapor retarder.

C. Welding certificates.

D. Qualification Data: For Installer, manufacturer and testing agency.

E. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures, including compatibility certification.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Curing compounds.
7. Floor and slab treatments.
8. Bonding agents.
9. Adhesives.
10. Vapor retarders.
11. Semirigid joint filler.
12. Joint-filler strips.
13. Repair materials.

F. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

G. Field quality-control test and inspection reports.

H. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."

F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

H. Mockups: Cast concrete slab-on-grade, toppings, washes, pourstrips and formed-surface panels to demonstrate reinforcement placement, typical joints, surface finish, texture, tolerances, and standard of workmanship.

1. Build panel approximately 200 sq. ft. for slab-on-grade, 100 sq. ft. for slabs/topping at supported levels, and 100 sq. ft. for formed surface in the location indicated or, if not indicated, as directed by Architect.
2. Approved panels may become part of the completed Work if undisturbed at time of Substantial Completion.

I. Preinstallation Conference: At least 30 days prior to the start of concrete work, conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1. Review proposed concrete design mixtures and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Independent testing agency responsible for field quality control.
d. Ready-mix concrete manufacturer.
e. Concrete subcontractor.
f. Primary admixture manufacturers.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab finish requirements, concrete repair procedures, and concrete protection.
3. Minutes of the meeting shall be recorded and prepared by the Contractor and distributed to all parties concerned within 5 days of the meeting.

    a. The minutes shall include a statement by the concrete subcontractor indicating that the proposed design mixtures and their placing, consolidating, finishing and curing procedures can produce the concrete quality required by the specifications.

J. For the purposes of this Specification, all concrete within the parking structure is considered to be "exposed to public view." Where the concrete surface is indicated to have an "Architectural Concrete Finish", the contactor shall adhere to the requirements as defined in Paragraph 3.8.D of this Section.

K. The Contractor shall keep the following references at the project site:

1. ACI 301 (latest edition) "Specification for Structural Concrete for Buildings."
2. ACI 305R "Hot Weather Concreting."
3. ACI 306.1 "Cold Weather Concreting."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FORM-FACING MATERIALS

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

1. Plywood, metal, or other approved panel materials.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60, deformed bars, assembled with clips.

C. Plain-Steel Wire: ASTM A 82, galvanized.

D. Deformed-Steel Wire: ASTM A 496.

E. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

F. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.5 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I. Use one brand of cement throughout Project unless otherwise acceptable to Architect. When permitted, supplement with the following:

   a. Fly Ash: ASTM C 618, Class F.
   b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

2. See Paragraph 2.13.B. for limitation of use for supplementary cementitious materials..

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: ASTM C 1260, Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.6 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

C. Non-Set-Accelerating Calcium Nitrite Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

1. Available Products:

a. Grace Construction Products, W. R. Grace & Co.; DCI-S.
b. Euclid Chemical Company (The); Eucon CIA (with appropriate retarder as required).
c. OR approved equal.

2. Add three (3) gallons per cu. yd. of concrete in cast-in-place beams, slabs, toppings, washes, and pourstrips.

2.7 FIBER REINFORCEMENT

A. Synthetic Fiber: Monofilament or fibrillated polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.

1. Available Products:

a. Monofilament Fibers:

1) Axim Concrete Technologies; Fibrasol IIP.
2) Euclid Chemical Company (The); Fiberstrand 100.
3) FORTA Corporation; Forta Mighty Mono.
4) Grace Construction Products, W. R. Grace & Co.; Grace MicroFiber.
5) Metalcrete Industries; Polystrand 1000.
6) SI Concrete Systems; Fibermesh 150.

b. Fibrillated Fibers:

1) Axim Concrete Technologies; Fibrasol F.
2) Euclid Chemical Company (The); Fiberstrand F.
3) FORTA Corporation; Forta Econo-Net.
4) Grace Construction Products, W. R. Grace & Co.; Grace Fibers.
5) SI Concrete Systems; Fibermesh.

2.8 CURING MATERIALS

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

1. Available Products:

a. Axim Concrete Technologies; Cimfilm.
b. Burke by Edoco; BurkeFilm.
c. ChemMasters; Spray-Film.
d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
e. Dayton Superior Corporation; Sure Film.
f. Euclid Chemical Company (The); Eucobar.
g. Kaufman Products, Inc.; Vapor Aid.
h. Lambert Corporation; Lambco Skin.
i. L&M Construction Chemicals, Inc.; E-Con.
j. MBT Protection and Repair, Div. of ChemRex; Confilm.
k. Meadows, W. R., Inc.; Sealtight Evapre.
l. Metalcrete Industries; Waterhold.
m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
n. Sika Corporation, Inc.; SikaFilm.
o. Symons Corporation, a Dayton Superior Company; Finishing Aid.
p. Unitex; Pro-Film.
q. US Mix Products Company; US Spec Monofilm ER.
r. Vexcon Chemicals, Inc.; Certi-Vex EnvioAssist.

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

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

D. Water: Potable.

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

1. Available Products:

a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
b. Burke by Edoco; Aqua Resin Cure.
c. ChemMasters; Safe-Cure Clear.
d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; W.B. Resin Cure.
e. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
f. Euclid Chemical Company (The); Kurez DR VOX.
g. Kaufman Products, Inc.; Thinfilm 420.
h. Lambert Corporation; Aqua Kure-Clear.
i. L&M Construction Chemicals, Inc.; L&M Cure W.
j. Meadows, W. R., Inc.; 1100 Clear.
k. Nox-Crete Products Group, Kinsman Corporation; Resin Cure E.
l. Symons Corporation, a Dayton Superior Company; Resi-Chem Clear Cure.
m. Tamms Industries, Inc.; Horncure WB 30.
n. Unitex; Hydro Cure 309.
o. US Mix Products Company; US Spec Maxcure Resin Clear.
p. Vexcon Chemicals, Inc.; Starseal 1315.

2.9 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 or aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types I and II, non-load bearing or IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.10 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Use of supplementary cementitious materials will be permitted in footings, pile caps, column piers, retaining walls and grade beams only. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Ground Granulated Blast-Furnace Slag: 50 percent.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
5. The exact percentages of supplementary cementitious materials used shall be based on successful placement onsite. If weather or other conditions affect the concrete properties, finishing, curing, etc. the contractor shall adjust the mix as required and resubmit for approval.
6. In mass concrete of more than 2 feet thick, the usage rate may be increased up to 50% for fly ash and 80% for slag as long as all other requirements are met.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent for prestressed or post-tensioned concrete and 0.15 percent for mildly reinforced concrete, by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use high range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Refer to the General Notes Sheet of the Contract Drawings.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116, and furnish batch ticket information.

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

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class C, 1/2 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

M. Do not use earth cuts as concrete formworks unless approved by the Engineer.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.

1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

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

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
3. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings, grade beams, pile caps, and floor slabs.
4. Space vertical joints in walls as indicated in the Drawings but not more than 20 ft. o.c. and 15 ft. from corners. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
5. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

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

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Use specified non-chloride accelerator only. Do not use calcium chloride, salts or other admixtures containing more than 0.05% chloride ions by weight.

F. Hot-Weather Placement: Comply with ACI 305 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of

ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
3. Use approved water-reducing, retarding admixture to "normalize" initial set.

3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

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

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete and as indicated.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Architectural Concrete Finish: Provide smooth uniform finish upon form removal with no patching, stoning or other form of repair, except washing, permitted unless otherwise noted, for walls, columns and other surfaces visible to view when the work is complete. The surface shall match approved jobsite mockup.

E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

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

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in 1 direction.

1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot-long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/4 inch

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.

F. Broom Finish for Flatwork in Parking and Drive Areas: Apply a broom finish to all driving and parking areas, ramps, and elsewhere as indicated.

1. Bullfloat immediately after screeding. Complete before any excess moisture or bleed water is present on surface (ACI 302.1R, Article 7.2.3). Use of power-propelled rotary trowelling machines with float blades shall be prohibited.
2. After excess moisture or bleed water has disappeared and concrete has stiffened sufficiently to allow operation, give slab surface a coarse straight broom transverse finish scored 3/16 inch deep texture by drawing a stiff bristle broom across surface perpendicular to main traffic route. Texture shall be as accepted by Architect from sample panels. Coordinate with Traffic Topping manufacturer and applicator as to acceptability.
3. Finishing Tolerance: Bullfloated floor finish tolerance per ACI 117 section 4.5.7. If required, more stringent tolerances shall be used to assure that the slabs drain freely to

floor drains. In addition, floor surface shall not vary more than ±3/4" from elevation noted on Drawings.

4. Before installation of flatwork and after submittal, review, and approval of concrete mix design, Contractor shall fabricate one or more acceptable test panels simulating finishing techniques and final appearance to be expected and used on Project. Test panels shall be minimum of 15 ft. in area cast to thickness of typical parking and drive area wearing surface in Project. (Maximum thickness of test panels need not exceed 6 inches.) Test panels shall be cast from concrete supplied by similar concrete batch used for this project. Contractor shall finish panels following requirements of items 1,2 and 3 above. Architect may reject finished panels, in which case Contractor shall repeat procedure until Architect acceptance is obtained. Accepted test panels shall be cured in accordance with specifications and may be incorporated into Project. Accepted test panels shall serve as basis for acceptance/rejection of final finished surfaces of all flatwork.
5. Finish all concrete slabs to proper elevations to insure that all surface water will drain freely to floor drains, and that no puddle areas exist. Contractor shall bear cost of any corrections to provide for this positive drainage requirement.
6. The Contractor shall arrange for and wet all slabs with water for the purpose of detecting any defects in the concrete that would result in leaks and/or inadequate drainage. Slab surfaces shall be wetted until water flows freely to drains. No finished spaces shall be sealed or insulated or ceilings installed until drainage test has been completed on the slab above and reviewed by the Architect for acceptance.

    a. Repair low spots, puddles, or bird baths with an area not less than four square feet of standing water with a visible sheen, isolated by drying concrete and smaller low spots that do not dry within 12 hours.
    b. Rout and seal leaking joints that are usually located at expansion joints, control joints, or construction joints. These leaking joints are located by water observed on the underside of the slabs and opposite faces of walls. If the expansion joint is not installed at the time of the flood test, this area shall be tested after it is installed.
    c. Rout and seal cracks that are located when water is observed on the underside of the slab. Cracks may also be observed on the top surface of the slab when the concrete slabs are drying and the cracks are highlighted with moisture.

3.10 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

3.11 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the methods shown below. Use moisture curing, moisture-retaining cover curing, or a combination thereof under normal weather conditions. Use of curing compounds shall be allowed only in excessive hot or cold weather conditions subject to the approval of the Engineer.

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound (to be used for hot or cold weather concreting only): Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

3.12 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/4 inch in any dimension in solid concrete, but not less than 1/2 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with approved underlayment or overlayment materials. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
5. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

6. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and /or polymer repair mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.13 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

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

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each truck of concrete. Reduce frequency of tests when concrete tests results were consistently within acceptable range upon approval from Engineer.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each truck of concrete. Reduce frequency to one test out of each composite sample when test results are consistently within acceptable range upon approval from Engineer.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

6. Compression Test Specimens: ASTM C 31/C 31M; choose either 6"x12" specimens (two cylinders per set) or 4"x8" specimens (three cylinders per set) for standard cylinder testing. Test minimum 4 sets of standard cylinders for P/T concrete, minimum 3 sets of standard cylinders for others, for each composite sample. Mold and store cylinders for laboratory-cured test specimens for 28-day strength testing. Field-cured cylinders shall be maintained at the site under conditions identical to concrete represented by them.

    a. Cast and field-cure 2 sets of standard cylinder specimens for P/T concrete and 1 set of standard cylinder specimens for others, for each composite sample.
    b. Cast and laboratory-cure 2 sets of standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39/C 39M.

    a. Test 1 set of field-cured specimens prior to P/T tendon stressing, 1 set of field-cured specimens at 7 days, and 1 set of laboratory-cured specimens at 28 days. Retain 1 set of laboratory-cured specimens in reserve for later testing if required.
    b. A compressive-strength test shall be the average compressive strength from a set of specimens obtained from same composite sample and tested at age indicated.

8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
11. Non-Compliant Test Reports: All test reports indicating non-compliance should be electronically sent immediately to all parties on the test report distribution list. Hard copies of non-conforming test reports shall be submitted on different colored paper.
12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
15. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.

END OF SECTION 033000

SECTION 033816 - UNBONDED POST-TENSIONED SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Furnishing post-tensioning reinforcement and accessories including encapsulated prestressing tendons, pocket formers, support bars, bar chairs, and slab bolsters.
2. Installing post-tensioning tendons.
3. Performing post-tensioning operations including stressing and finishing tendons.
4. Coordinating and recording tendon elongations and gage pressures with Testing Agency.
5. Finishing tendon ends and patching stressing pockets.

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for cast-in-place concrete, steel reinforcement, placement of nonprestressed steel reinforcement, and concrete strength testing of laboratory- and field-cured cylinders.

1.3 DEFINITIONS

A. Strand Tail: Excess strand length extending past the anchorage device.

B. Stressing Blockout: Opening created in the slab to allow access to stressing-end anchorages.

C. Stressing Pocket: Void formed by pocket former at stressing-end anchorage to provide required cover over wedges and strand tail.

D. Wedge Cavity: Cone-shaped hole in anchorage device designed to hold the wedges that anchor the strand.

1.4 PERFORMANCE REQUIREMENTS

A. Unbonded post-tensioning system described here is intended to perform in corrosive environment without long-term corrosion or other distress. Post-tensioning strand, couplers, intermediate and end anchorages shall be completely protected with encapsulated, watertight system. Tendon grease shall be as specified, with corrosion inhibitors. End anchors shall be protected against long-term corrosion

B. Structural Performance: Design cast-in-place, post-tensioned concrete reinforcement as indicated in this Section. Show final effective forces, tendon profiles, and nonprestressed reinforcement on design Shop Drawings.

C. Employ professional Engineer, registered in the State of Connecticut, and acceptable to Owner, to perform design. Sign and seal design Shop Drawings and design calculations submitted to Owner for review. Prepare and seal drawings and calculations for submittal to authorities having jurisdiction. Comply with design intent, criteria, and requirements of the Contract Documents.

D. This structure is designed to withstand the loads according to governing codes, under conditions indicated in the Drawings, and within limits of the average precompression stresses as follows:

1. Minimum Average Slab Precompression: 150 psi.
2. Maximum Average Slab Precompression: 300 psi.
3. Minimum Average Precompression in T-, L-, and Rectangular-Beam Cross Sections: 200 psi.
4. Minimum Precompression in Slab Section Not Included in T- or L-Beam Section: 150 psi.
5. Maximum Precompression in Transfer Girders: 1000 psi. Specify stage-stressing sequence to avoid overstress.

E. Comply with ACI 318 limits on stresses at transfer of prestress and under service load.

F. Comply with ACI 318 requirements for minimum bonded reinforcement.

G. Refer to the Drawings for concrete cover over reinforcement.

H. Design members such that thickness and concrete cover over reinforcement comply with fire-resistance requirements of authorities having jurisdiction.

I. Design members such that thickness and concrete cover over reinforcement comply with the following fire-resistance requirements:

1. Slabs: Two hours.
2. Beam: Two hours.

J. Deflection Limits Including Creep and Shrinkage Effects:

1. Total Dead Load: L/600.
2. Total Dead Plus Live Load: L/360.

K. Slab Design:

1. Minimum Slab Thickness: Nominal 6inches (verify in field).
2. Locate closure strips at midspan and adjust tendon forces and profiles accordingly. Calculate moments in spans with closure strips assuming a continuous slab. Provide only nonprestressed reinforcement within closure strips. Design reinforcement in closure strip to carry ultimate moment at midspan.

1.5 ACTION SUBMITTALS

A. Product Data: For the following:

1. Post-tensioning coating.
2. Tendon sheathing.
3. Anchorage devices.
4. Tendon couplers.
5. Bar and tendon supports.
6. Pocket formers.
7. Sheathing repair tape.
8. Stressing-pocket patching material.
9. Encapsulation system.

B. Shop Drawings: Installation drawings including plans, elevations, sections, details, and notes prepared by or under the supervision of a registered professional engineer detailing tendon layout and installation procedures, including the following:

1. Numbers, arrangement, and designation of post-tensioning tendons.
2. Tendon profiles and method of tendon support including chair heights and locations. Show tendon profiles at sufficient scale to clearly indicate all support points, with their associated heights.
3. Construction joint locations, pour sequence, locations of anchorages and blockouts required for stressing.
4. Stressing procedures and jacking force to result in final effective forces used in determining number of tendons required.
5. Sealed calculations prepared by a registered structural engineer indicating method of elongation calculation including values used for friction coefficients, anchorage seating loss, elastic shortening, creep, relaxation, and shrinkage.
6. Calculated elongations for each tendon.
7. Details for horizontal curvature around openings and at anchorages.
8. Details for corners and other locations where tendon layouts may conflict with one another or nonprestressed reinforcing steel.
9. Diagrams and notes as necessary for positioning of nonprestressed reinforcement required for installing post-tensioning tendons including, but not limited to, the following:

    a. Support bars.
    b. Backup bars and hairpins at anchorages.
    c. Hairpins at locations of horizontal curvature.
    d. Supplemental reinforcement at blockouts.

C. Design Shop Drawings and calculations.

1.6 INFORMATIONAL SUBMITTALS

A. Samples for Verification: For the following products:

1. Each anchorage device assembly with a minimum of 24 inches of coated, sheathed strand.

a. Include components of encapsulation system.

2. Each coupler assembly with a minimum of 24 inches of coated, sheathed strand.

a. Include components of encapsulation system.

3. All components of encapsulation system, unassembled and clearly marked as to usage.

B. Product Certificates:

1. For each type of anchorage device and coupler, signed by product manufacturer.
2. For each type of encapsulation system, signed by product manufacturer.

C. Qualification Data: For Installer. Include resume of individual supervising installation and stressing of post-tensioning tendons.

D. Mill Test Reports: Certified mill test reports for prestressing strand used on Project indicating that strand is low-relaxation and including the following:

1. Coil numbers or identification.
2. Breaking load.
3. Load at 1 percent extension.
4. Elongation at failure.
5. Modulus of elasticity.
6. Diameter and net area of strand.

E. Field quality-control test reports.

F. Procedures Statement: Procedures for cutting excess strand tail and patching stressing pocket.

G. Stressing Jack Calibration: Calibration certificates for jacks and gages to be used on Project. Calibrate each jack-and-gage set as a pair.

H. Stressing Records: Filled out and coordinated with testing agency during stressing operation with the following information recorded:

1. Name of Project.
2. Date of approved installation drawings used for installation and stressing.
3. Floor number and concrete placement area.
4. Date of stressing operation.
5. Weather conditions including temperature and rainfall.
6. Name and signature of inspector.
7. Name of individual in charge of stressing operation.
8. Serial or identification numbers of jack and gage.
9. Date of jack-and-gage calibration certificates.
10. Gage pressure to achieve required stressing force per supplied calibration chart.
11. Tendon identification mark.
12. Calculated tendon elongation.
13. Actual tendon elongation.
14. Actual gage pressure.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer whose full-time Project superintendent has successfully completed PTI's Level 1 - Field Fundamentals course or has equivalent verifiable experience and knowledge acceptable to Architect.

1. Superintendent must have received training from post-tensioning supplier in the operation of stressing equipment to be used on Project.

B. Manufacturer Qualifications: Fabricating plant certified by PTI according to procedures set forth in PTI's "Manual for Certification of Plants Producing Unbonded Single Strand Tendons."

C. Testing Agency Qualifications: Owner will hire an independent agency qualified according to ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Testing Agency Inspector: Personnel performing field inspections and measuring elongations shall have successfully completed PTI's Level 1 - Field Fundamentals course or shall have equivalent qualifications acceptable to Architect.

D. Source Limitations: Obtain post-tensioning materials and equipment from the same supplier.

1. Stressing jacks not provided by post-tensioning supplier must be calibrated and approved for use on Project by post-tensioning supplier.

E. ACI Publications: Comply with ACI 423.6, "Specification for Unbonded Single Strand Tendons," unless otherwise indicated in the Contract Documents.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings." Review methods and procedures related to installation and stressing of post-tensioning tendons including, but not limited to, the following:

1. Construction schedule and availability of materials, personnel, and equipment needed to make progress and avoid delays.
2. Storage of post-tensioning materials on-site.
3. Structural load limitations.
4. Coordination of post-tensioning installation drawings and nonprestressed reinforcing steel placing drawings.
5. Horizontal and vertical tolerances on tendon and nonprestressed reinforcement placement.
6. Marking and measuring of elongations.
7. Submittal of stressing records and requirements for tendon finishing.
8. Removal of formwork.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle post-tensioning materials according to PTI's "Field Procedures Manual for Unbonded Single Strand Tendons."

B. Inspect tendons and accessory items at time of their delivery to Project site, prior to off-loading. Notify post-tensioning supplier of observed damage prior to off-loading.

C. Keep accurate and current records of materials delivered and used.

D. Immediately remove from Project site any tendons with damaged strand.

1.9 COORDINATION

A. Attachments and Penetrations:

1. Attach permanent fixtures such as curtain-wall systems, handrails, fire-protection equipment, lights, and security devices to the slab using embedded anchors. Drilled anchors are not allowed unless authorized in writing by Architect.
2. Power-driven fasteners are not allowed unless authorized in writing by Architect.
3. Core drilling for sleeves or other penetrations is not allowed unless authorized in writing by Architect.
4. Protect penetrations within 18 inches of an anchorage with ASTM A 53/A 53M, Schedule 40 steel pipe.

PART 2 - PRODUCTS

2.1 PRESTRESSING TENDONS

A. Prestressing Strand: ASTM A 416/A 416M, Grade 270, uncoated, 7-wire, low-relaxation, 0.5-inch- diameter strand.

B. Post-Tensioning Coating: Compound with friction-reducing, moisture-displacing, and corrosion-inhibiting properties specified in ACI 423.6; chemically stable and nonreactive with prestressing steel, nonprestressed reinforcement, sheathing material, and concrete.

1. Minimum Coating Weight: 2.5 lb for 0.5-inch- diameter strand per 100 feet of strand.
2. Completely fill annular space between strand and sheathing over entire tendon length with post-tensioning coating.

C. Tendon Sheathing: Comply with ACI 423.6.

1. Minimum Thickness: 0.050 inch for polyethylene or polypropylene with a minimum density of 0.034 lb/cu. in..
2. Continuous over the entire length of tendon to provide watertight encapsulation of strand.

D. Anchorage Device and Coupler Assembly: Assembly of strand, wedges, and anchorage device or coupler complying with static and fatigue testing requirements in ACI 423.6 and capable of developing 95 percent of actual breaking strength of strand.

1. Anchorage Bearing Stresses: Comply with ACI 423.6 for stresses at transfer load and service load.
2. Fixed-End Anchorage Device Assemblies: Plant fabricated with wedges seated at a load of not less than 80 percent and not more than 85 percent of breaking strength of strand.

E. Encapsulation System: Watertight encapsulation of prestressing strand consisting of the following:

1. Wedge-Cavity Caps: Attached to anchorages with a positive mechanical connection and completely filled with post-tensioning coating.

    a. Caps for Fixed and Stressing-End Anchorages Devices: Designed to provide watertight encapsulation of wedge cavity. Sized to allow required extension of strand past the wedges.

        1) Attach cap for fixed-end anchorage device in fabricating plant.

    b. Caps at Intermediate Anchorages: Open to allow passage of strand.

2. Sleeves: Attached to anchorage device with positive mechanical connection; overlapped a minimum of 4 inches with sheathing and completely filled with post-tensioning coating.

2.2 NONPRESTRESSED STEEL BARS

A. Epoxy-Coated Support Bars, Reinforcing Bars, Hairpins: ASTM A 615/A 615M, Grade 60, deformed bars, ASTM A 775/A 775M epoxy coated with less than 2 percent damaged coating in each 12-inch bar length.

1. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on bars and complying with ASTM A 775/A 755M. Repair damaged areas according to ASTM D 3963/D 3963M.

B. Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening tendons and tendon support bars in place. Manufacture bar supports, according to CRSI's "Manual of Standard Practice," from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:

1. For uncoated bars, use all-plastic bar supports.
2. For epoxy-coated bars, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.3 ACCESSORIES

A. Pocket Formers: Capable of completely sealing wedge cavity; sized to provide the required cover over the anchorage and allow access for cutting strand tail.

B. Anchorage Fasteners: Stainless-steel nails, wires, and screws used to attach anchorage devices to formwork.

C. Sheathing Repair Tape: Elastic, self-adhesive, moistureproof tape with minimum width of 2 inches, in contrasting color to tendon sheathing; nonreactive with sheathing, coating, or prestressing steel.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

    a. Adhesive Tape Products, Inc.; PWT-20.
    b. 3M; Tape 226.

c. Tyco Adhesives; Polyken 826.
d. OR approved equal.

2.4 PATCHING MATERIAL

A. Patching Material: One component, polymer-modified, premixed patching material containing selected silica aggregates and portland cement, suitable for vertical and overhead application. Do not use material containing chlorides or other chemicals known to be deleterious to prestressing steel or material that is reactive with prestressing steel, anchorage device material, or concrete.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

a. Euclid Chemical Company (The); Verticoat Supreme.
b. Fox Industries, Inc.; FX-228.
c. Kaufman Products, Inc.; Patchwell Kit HB.
d. BASF Building Systems; MasterEmaco N 350 CI.
e. Sika Corporation, Inc.; SikaMonoTop 612.
f. OR approved equal.

2.5 DESIGN FORCES AND STRESSES

A. Effective post-tensioning forces, after all losses have occurred, are shown on Drawings.

B. Maximum tensile stress in post-tensioning tendons due to jacking forces shall not exceed 80 percent of specified tensile strength or 94 percent of specified yield strength of post-tensioning tendon, whichever is smaller, but not greater than maximum value recommended by manufacturer of post-tensioning tendons.

C. Maximum tensile stress in post-tensioning tendons immediately after anchorage shall not exceed 70 percent of specified tensile strength.

D. Allowable slip of strand at anchorage shall not exceed 1/4 inch. Measured elongation shall be within +/- 7% of calculated.

E. Design effective prestress force shown on Drawings and design moment strength of all post-tensioned sections are based on effective stress of **173,200 psi** in P/T tendons after allowance for all prestress losses.

PART 3 - EXECUTION

3.1 FORMWORK

A. Provide formwork for post-tensioned elements as specified in Division 3 Section "Cast-in-Place Concrete." Design formwork to support load redistribution that may occur during stressing

operation. Ensure that formwork does not restrain elastic shortening, camber, or deflection resulting from application of prestressing force.

B. Do not remove forms supporting post-tensioned elements until tendons have been fully stressed and elongations have been approved by Architect, unless authorized in writing by Architect.

C. Do not place concrete in supported floors until tendons on supporting floors have been stressed and elongations have been approved by Architect, unless authorized in writing by Architect.

3.2 NONPRESTRESSED STEEL REINFORCEMENT PLACEMENT

A. Placement of nonprestressed steel reinforcement is specified in Division 3 Section "Cast-in-Place Concrete.". Coordinate placement of nonprestressed steel reinforcement with installation of post-tensioning tendons.

3.3 TENDON INSTALLATION

A. Install tendons according to approved installation drawings and procedures stated in PTI's "Field Procedures Manual for Unbonded Single Strand Tendons."

B. Tendon Supports: Provide continuous slab bolsters or bars supported on individual high chairs spaced at a maximum of 42 inches o.c. to ensure tendons remain in their designated positions during construction operations and concrete placement.

1. Support tendons as required to provide profiles shown on installation drawings. Position supports at high and low points and at intervals not exceeding 48 inches. Ensure that tendon profiles between high and low points are smooth parabolic curves.
2. Attach tendons to supporting chairs and reinforcement without damaging tendon sheathing.
3. Support slab tendons independent of beam reinforcement.

C. Maintain tendon profile within maximum allowable deviations from design profile as follows:

1. 1/4 inch for member depth less than or equal to 8 inches.
2. 3/8 inch for member depth greater than 8 inches and less than or equal to 24 inches.
3. 1/2 inch for member depth greater than 24 inches.

D. Maintain minimum radius of curvature of 480-strand diameters for lateral deviations to avoid openings, ducts, and embedded items. Maintain a minimum of 2 inches of separation between tendons at locations of curvature.

E. Limit tendon bundles to five tendons. Do not twist or entwine tendons within a bundle. Maintain a minimum distance of 12 inches between center of adjacent bundles.

F. If tendon locations conflict with nonprestressed reinforcement or embedded items, tendon placement governs unless changes are authorized in writing by Architect. Obtain Architect's approval before relocating tendons or tendon anchorages that interfere with one another.

G. Deviations in horizontal spacing and location of slab tendons are permitted when required to avoid openings and inserts.

H. Installation of Anchorage Devices:

1. Place anchorage devices at locations shown on approved installation drawings.
2. Do not switch fixed and stressing-end anchorage locations unless authorized in writing by Architect.
3. Attach pocket formers, intermediate anchorage devices, and stressing-end anchorage devices securely to bulkhead forms. Install stressing-end and intermediate anchorage devices perpendicular to tendon axis.
4. Install tendons straight, without vertical or horizontal curvature, for a minimum of 12 inches behind stressing-end and intermediate anchorages.
5. Embed intermediate anchorage devices at construction joints in first concrete placed at joint.
6. Minimum splice length in reinforcing bars at anchorages is 24 inches. Stagger splices a minimum of 60 inches.
7. Place fixed-end anchorage devices in formwork at locations shown on installation drawings. Support anchorages firmly to avoid movement during concrete placement.
8. Remove loose caps on fixed-end anchorages, refill with post-tensioning coating, and re-attach caps to achieve a watertight enclosure.

I. Maintain minimum concrete cover as follows:

1. From Exterior Edge of Concrete to Wedge Cavity: 2 inches.
2. From Exterior Edge of Concrete to Strand Tail: 1-1/2 inches.
3. From Exterior Edge of Concrete to Wedge-Cavity Cap: 1-1/2 inch.
4. Top, Bottom, and Edge Cover for Anchorage Devices: 1-1/2 inches.

J. Maintain minimum clearance of 6 inches between tendons and openings.

K. Prior to concrete placement, mark tendon locations on formwork with spray paint.

L. Do not install sleeves within 36 inches of anchorages after tendon layout has been inspected unless authorized in writing by Architect.

M. Do not install conduit, pipe, or embeds requiring movement of tendons after tendon layout has been inspected unless authorized in writing by Architect.

N. Do not use couplers unless location has been approved by Architect.

3.4 SHEATHING INSPECTION AND REPAIR

A. Inspect sheathing for damage after installing tendons. Repair damaged areas by restoring post-tensioning coating and repairing or replacing tendon sheathing.

1. Ensure that sheathing is watertight and there are no air voids.
2. Follow tape repair procedures in PTI's "Field Procedures Manual for Unbonded Single Strand Tendons."

B. Immediately remove and replace tendons that have damaged strand.

3.5 CONCRETE PLACEMENT

A. Do not place concrete until placement of tendons and nonprestressed steel reinforcement has been inspected by testing agency.

B. Provide Architect and testing agency a minimum of 48 hours' notice before concrete placement.

C. Place concrete as specified in Division 3 Section "Cast-in-Place Concrete." Ensure compaction of concrete around anchorages.

D. Ensure that position of tendon and nonprestressed steel reinforcement does not change during concrete placement. Reposition tendons and nonprestressed steel reinforcement moved during concrete placement.

E. Ensure that method of concrete placement does not damage tendon sheathing. Do not support pump lines, chutes, or other concrete placing equipment on tendons.

3.6 TENDON STRESSING

A. Calibrate stressing jacks and gages at start of job and at least every six months thereafter. Keep copies of calibration certificates for each jack-and-gage pair on Project site and available for inspection. Exercise care in handling stressing equipment to ensure that proper calibration is maintained.

B. Stress tendons only under supervision of qualified post-tensioning superintendent.

C. Do not begin stressing operations until concrete strength has reached 3000 psi as indicated by compression tests of field-cured cylinders.

D. Complete stressing within 96 hours of concrete placement.

E. If concrete has not reached required strength, obtain Architect's approval to partially stress tendons and delay final stressing until concrete has reached required strength.

F. If detensioning and restressing of tendon is required, discard wedges used in original stressing and provide new wedges.

G. Mark and measure elongations according to PTI's "Field Procedures Manual for Unbonded Single Strand Tendons." Measure elongations to closest 1/8 inch.

H. Submit stressing records within one day of completion of stressing. If discrepancies between measured and calculated elongations exceed plus or minus 7 percent, resolve these discrepancies to satisfaction of Architect.

I. Prestressing will be considered acceptable if gage pressures shown on stressing record correspond to required stressing force and calculated and measured elongations agree within 7 percent.

J. If measured elongations deviate from calculated elongations by more than 7 percent, additional testing, restressing, strengthening, or replacement of affected elements may be required.

3.7 TENDON FINISHING

A. Do not cut strand tails or cover anchorages until stressing records have been reviewed and approved by Architect.

B. Cut strand tails as soon as possible after approval of elongations.

C. Cut strand tail between 1/2 and 3/4 inch from wedges. Do not damage tendon or concrete during removal of strand tail. Acceptable methods of cutting strand tail include the following:

1. Oxyacetylene flame.
2. Abrasive wheel.
3. Hydraulic shears.
4. Plasma cutting.

D. Install caps and sleeves on intermediate anchorages within one day of stressing.

E. Cut strand tails and install caps on stressing-end anchorages within one day of Architect's acceptance of elongations.

F. Patch stressing pockets within one day of cutting strand tail. Clean inside surface of pocket to remove laitance or post-tensioning coating before installing patch material. Finish patch material flush with adjacent concrete.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports. Cooperate with testing agency to facilitate the execution of its duties.

1. Before concrete placement, testing agency will inspect the following for compliance with post-tensioning installation drawings and the Contract Documents:

    a. Location and number of tendons.
    b. Tendon profiles and cover.
    c. Installation of backup bars, hairpins, and other nonprestressed reinforcement shown on post-tensioning installation drawings.
    d. Installation of pocket formers and anchorage devices.
    e. Repair of damaged sheathing.
    f. Connections between sheathing and anchorage devices.

2. Testing agency will record tendon elongations during stressing.
3. Testing agency will immediately report deviations from the Contract Documents to Architect.

3.9 PROTECTION

A. Do not expose tendons to electric ground currents, welding sparks, or temperatures that would degrade component.

B. Protect exposed components within one workday of their exposure during installation.

C. Prevent water from entering tendons during installation and stressing.

D. Provide weather protection to stressing-end anchorages if strand tails are not cut within 10 days of stressing the tendons.

3.10 REPAIRS

A. Submit repair procedure to Architect for evaluation and approval.

B. Do not proceed with repairs requiring removal of concrete unless authorized in writing by Architect.

END OF SECTION 033816

SECTION 039300 - CONCRETE REHABILITATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Concrete repairs <= 3"
2. Removal of deteriorated concrete and subsequent patching and rebuilding.
3. Floor joint repair.
4. Epoxy crack injection.
5. Corrosion-inhibiting treatments.
6. Polymer overlays, including preparation (epoxy traffic deck membrane).
7. Polymer sealers.
8. Steel structural reinforcement.
9. Embedded galvanic anodes.

B. Related Sections include the following:

1. Division 1 Section "Selective Demolition."
2. Division 3 Section "Cast-in-Place Concrete."
3. Division 7 Section "Garage Waterproofing" for waterproofing to be applied to concrete surfaces and joints.

1.3 UNIT PRICES

A. Unit prices include costs of field quality-control testing required by the Work for which the unit price applies.

B. Concrete Removal and Patching or Rebuilding: Work will be paid for by the cubic foot computed on the basis of rectangular solid shapes approximating the actual shape of concrete removed and replaced with average depths, widths, and lengths, measured to the nearest inch.

1. Reinforcing bar replacement will be paid for separately by the pound of replacement steel with welded and mechanical splices paid for by the unit.

C. Epoxy Crack Injection: Work will be paid for by the linear foot of crack injected.

D. Polymer Overlays: Work, which includes surface preparation, will be paid for by the square foot of exposed overlay surface.

1.4 REFERENCES

A. ACI/ICRI 2003 Concrete Repair Manual
B. ACI 222R Corrosion of Metals in Concrete
C. ACI 503.3-10 Specification for Producing a Skid-Resistant Surface on Concrete by the Use of Epoxy and Aggregate
D. ASTM C 309 Curing Compounds for Concrete
E. ASTM B418-95a Standard Specification for Cast and Wrought Galvanic Zinc Anodes
F. ASTM A82-97a Specification for Plain Steel Wire for Concrete Reinforcement
G. ASTM C-881, "Specification for Epoxy Resin Base Bonding Systems for Concrete"
H. ICRI Technical Guideline No. 310.1R-2008, "Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion."
I. ICRI Technical Guideline No. 310.2-1997, "Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays."
J. ICRI Technical Guideline No. 210.1-1998, "Guide for Verifying Field Performance of Epoxy Injection of Concrete Cracks".

1.5 ACTION SUBMITTALS

A. Product Data: Include material descriptions, chemical composition, physical properties, test data, and mixing and application instructions.

1. Include Material Safety Data Sheets, if applicable.

B. Samples: Cured samples of overlay and patching materials.

C. Embedded galvanic anodes: in addition to the submittals required above, provide the following submittals:

1. Anode layout completed by manufacturer for embedded galvanic anodes.
   a. Anode spacing shall be based on the reinforcing bar steel density ratio for both corroded bar and non-corroded bar conditions. Provide anode spacing for each reinforcing bar layout that is applicable to the project. Provide a table showing the reinforcing bar size & spacing, the reinforcing bar steel density ratio, condition of steel (corroded / non-corroded), and the anode spacing. This table shall be used by the Contractor to determine the required spacing once a repair cavity is excavated; notify Architect for review and approval of the anode spacing prior to completing the concrete repair.
   b. Provide typical anode layouts for reinforcing bar that IS NOT in contract with the existing concrete at the bottom of the repair area: anodes spaced evenly along edge of repair area.
   c. Provide typical anode layouts for reinforcing bar that IS in contract with the existing concrete at the bottom of the repair area: anodes spaced evenly along edge of repair area as well as within the interior of the repair area.

2. Resistivity readings for continuity of rebar and each anode connection. Include a plan that numbers each anode.

1.6 INFORMATION SUBMITTALS

A. Shop Drawings: For formwork and temporary shoring and supports, prepared by or under the supervision of a qualified professional engineer. Design and engineering of formwork and temporary shoring and supports are Contractor's responsibility. Indicate proposed schedule and sequence for removal of formwork and temporary shoring and supports.

B. Product Certificates: Signed by manufacturers certifying that products furnished comply with requirements and are recommended by manufacturer for uses indicated. Include compatibility certifications for all materials that come in contact with each other, including but not limited to bonding agents, patching mortars, concrete, corrosion-inhibiting treatments, sealers, polymer overlays (epoxy deck membranes), galvanic anodes, etc.

C. Qualification Data: For installers, professional engineer, manufacturers, and testing agency to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1. For products required to be installed by workers approved by product manufacturers, include letters of acceptance by product manufacturers certifying that installers are approved to apply their products.

D. Field quality-control test and inspection reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

E. Rehabilitation program for each phase of the rehabilitation process, including protection of surrounding materials and Project site during operations. Describe in detail the materials, methods, equipment, and sequence of operations to be used for each phase of the Work.

1. If alternative materials and methods to those indicated are proposed for any phase of rehabilitation work, submit substitution request complying with Division 1 Section "Product Requirements" and provide a written description of proposed materials and methods, including evidence of successful use on other comparable projects, and a testing program to demonstrate their effectiveness for this Project.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: In addition to other requirements in Division 1 Section "Quality Requirements," retain installers that employ workers trained and approved by manufacturer to apply corrosion-inhibiting treatments, concrete patching and rebuilding materials, epoxy crack injection materials, polymer overlays, polymer sealers, and composite structural reinforcement.

B. Manufacturer Qualifications: In addition to other requirements in Division 1 Section "Quality Requirements," manufacturers shall have factory-trained representatives who are available for consultation and Project site inspection at no additional cost.

C. Source Limitations: Obtain concrete patching and rebuilding materials, epoxy crack injection materials, and composite structural reinforcement materials through one source from a single manufacturer.

D. Source Limitations: Obtain each of the following through one source from a single manufacturer:

1. Concrete patching and rebuilding materials.
2. Epoxy crack injection materials.

E. Mockups: Build mockups for concrete removal and patching, floor joint repair, epoxy crack injection, polymer overlays, polymer sealers, and composite structural reinforcement to demonstrate qualities of materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original and unopened containers, labeled with type and name of products and manufacturers.

B. Comply with manufacturer's written instructions for minimum and maximum temperature requirements and other conditions for storage.

C. Store cementitious materials off the ground, under cover, and in a dry location.

D. Store aggregates, covered and in a dry location, where grading and other required characteristics can be maintained and contamination avoided.

1.9 PROJECT CONDITIONS

A. Environmental Limitations for Epoxies:

1. Do not apply to damp or wet substrates unless approved by manufacturer. The deck surface shall be dry at time of application according to ASTM D4263, Standard Test Method for Indicating Moisture in Concrete.
2. Do not apply when ambient and substrate temperatures are outside limits permitted in writing by manufacturer. During hot weather, cool epoxy components before mixing, store mixed products in shade, and cool unused mixed products to retard setting.
3. Do not apply when temperatures are below 40 deg F or above 90 deg F, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg Fabove dew point.

B. Cold-Weather Requirements for Cementitious Materials: Do not apply unless air temperature is between 40 and 90 deg Fand will remain so for at least 48 hours after completion of Work.

C. Cold-Weather Requirements for Cementitious Materials: Comply with the following procedures:

1. When air temperature is below 40 deg F, heat patching material ingredients and existing concrete to produce temperatures between 40 and 90 deg F.
2. When mean daily air temperature is between 25 and 40 deg F, cover completed Work with weather-resistant insulating blankets for 48 hours after repair.

3. When mean daily air temperature is below 25 deg F, provide enclosure and heat to maintain temperatures above 32 deg Fwithin the enclosure for 48 hours after repair.

D. Hot-Weather Requirements for Cementitious Materials: Protect repair work when temperature and humidity conditions produce excessive evaporation of water from patching materials. Provide artificial shade and wind breaks, and use cooled materials as required. Do not apply to substrates with temperatures of 90 deg Fand above.

1.10 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer's standard form in which the Manufacturer agrees to furnish and repair or replace the product(s) that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period for all products listed in Part 2 of this Section, unless noted otherwise: Three years from date of Substantial Completion.

B. Special Installer's Warranty: Manufacturer's standard form in which the Installer agrees to repair or replace the product(s) that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period for the installation of products listed in Part 2 of this Section, unless noted otherwise: Three years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure from the following:

1. Movement caused by structural settlement or errors attributable to design or construction resulting in stresses exceeding the manufacturer's written specifications for elongation and compression.
2. Disintegration from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

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

1. Epoxy-Modified, Cementitious Bonding and Anticorrosion Agent:

a. Euclid Chemical Company; Duralprep AC.
b. Mapei Corporation; Planibond 3C
c. Sika Corporation; Armatec 110 EpoCem.

2. Epoxy Bonding Agent:

   a. Euclid Chemical Company; EUCO #452 EPOXY SYSTEM,.
   b. Mapei Corporation; Planibond EBA; Planibond AE
   c. Sika Corporation; Sikadur 32 Hi-Mod, or Sikadur 32 Hi-Mod LPL.
   d. BASF Building Systems; MasterEmaco ADH 326.

3. Cementitious Patching Mortar:

   a. Mapei Corporation; Planitop X, Planitop XS, Planitop 12
   b. Sika Corporation; SikaRepair 223 or SikaRepair SHB.
   c. BASF Building Systems; MasterEmaco S 440, Master Emaco S 440 MC, MasterEmaco S 440 CI, MasterEmaco S466 CI, MasterEmaco S477 CI, or MasterEmaco S488 CI.

4. Cementitious Patching Mortar, Rapid Setting:

   a. Dayton Superior Corporation; Re-Crete 5 Minute, or Re-Crete 20 Minute.
   b. Euclid Chemical Company; EUCO-SPEED.
   c. Kaufman Products, Inc.; Duracrete II or Duracrete II FR.
   d. Mapei Corporation; Planitop 18 or Planitop 18ES
   e. Sika Corporation; SikaQuick 1000.
   f. BASF Building Systems; MasterEmaco T 1060, MasterEmaco T 1061, MasterEmaco T 415, or MasterEmaco T 430.

5. Polymer-Modified, Cementitious Patching Mortar:

   a. Dayton Superior Corporation; HD50 or Thin Resurfacer.
   b. Euclid Chemical Company; CONCRETE COAT, THINCOAT, or VERTICOAT.
   c. Kaufman Products, Inc.; Patchwell, Patchwell Kit, Patchwell Deep, or Patchwell VO.
   d. Mapei Corporation; Planitop 21, Planitop 23, Mapecem 102, Mapecem 202
   e. Sika Corporation; SikaTop 121 Plus, SikaTop 122 Plus, or SikaTop 123 Plus.
   f. BASF Building SystemsMasterEmaco N 400, MasterEmaco N 400 RS, MasterEmaco N 300 CI, MasterEmaco T 310 CI, or MasterEmaco T 302.

6. Epoxy-Modified, Cementitious Patching Mortar:

   a. Sika Corporation; Sikagard 75 EpoCem.

7. Epoxy Joint Filler:

   a. Euclid Chemical Company; EUCO 700.
   b. Kaufman Products, Inc.; SurePoxy Flexijoint.
   c. Metzer/McGuire; MM-80 SPAL-PRO XL.
   d. Mapei Corporation; Planibond JF
   e. Sika Corporation; Sikadur 51 NS or Sikadur 51 SL.
   f. Unitex; Pro-Flex or Pro-Flex Gel.
   g. BASF Building Systems; MasterSeal CR190.

8. Epoxy Crack Injection Adhesive:

a. Dayton Superior Corporation; Sure-Inject (J-56).
b. Euclid Chemical Company; EUCO #352 LV, EUCO #452 LV, or EUCOPOXY INJECTION RESIN.
c. Kaufman Products, Inc.; SurePoxy HMLV, SurePoxy HMLV-Class B, or SurePoxy HM-SLV.
d. Mapei Corporation; Epojet or Epojet LV.
e. Sika Corporation; Sikadur 35 Hi-Mod LV, Sikadur 35 Hi-Mod LV LPL, Sikadur 52, or Sikadur Injection Gel.
f. Unitex; Pro-Poxy 50 SuperLV or Pro-Poxy 100 LV.
g. BASF Building Systems; MasterInject 1500, MasterInject 1380 or MasterInject 1000.

9. Corrosion-Inhibiting Treatments (Water-based products):

a. CORTEC Corp.; MCI 2005 or MCI 2020.
b. Sika Corporation; Sika FerroGard 903.
c. Evonik Industries; Protectosil 300.
d. Mapei Corporation; Mapeshield CI 100.
e. Surtreat International; TPS II

10. Polymer Overlays (Epoxy Traffic Deck Coating):

a. Kaufman Products, Inc.; SurePoxy VLM or SurePoxy VLM-Class B.
b. Mapei Corporation; Planiseal Traffic Coat Epoxy Broadcast System
c. Sika Corporation; Sikadur Epoxy Broadcast Overlay System.
d. Unitex; Pro-Poxy Type III D.O.T.
e. BASF Building Systems; MasterSeal 350.
f. The Euclid Chemical Company; Flexolith Broadcast Overlay System.
g. Neogard Division, Jones Blair Company; Neogard Epoxy Broadcast System.

11. Epoxy Sealers:

a. Euclid Chemical Company; EUCO #512 Epoxy Sealer.
b. Mapei Corporation; Planiseal LVB
c. Kaufman Products, Inc.; SurePoxy HMSLV.
d. Sika Corporation; Sikadur 55 SLV.
e. Unitex; Pro-Poxy 50-1.

12. Embedded Galvanic Anodes (anode zinc content must not be less than 100 g):

a. Sika FerroGard 670 by Sika Corporation
b. Sentinel Silver by The Euclid Chemical Company
c. MasterProtect 8105 CP by BASF
d. Mapeshield I-10/10 by Mapei Corporation
e. Galvashield XP2 and XP4 by Vector Corrosion Technologies

2.2 BONDING AGENTS

A. Epoxy-Modified, Cementitious Bonding and Anticorrosion Agent: Product that consists of water-insensitive epoxy adhesive, portland cement, and water-based solution of corrosion-inhibiting chemicals that forms a protective film on steel reinforcement.

B. Epoxy Bonding Agent: ASTM C 881, Type II.

1. Thin Film Open Time: Not less than 24 hours.

C. Mortar Scrub-Coat: 1 part portland cement complying with ASTM C 150, Type I, II, or III and 1 part fine aggregate complying with ASTM C 144, except 100 percent passing a No. 16 sieve.

2.3 PATCHING MORTAR

A. Patching Mortar: Unless otherwise indicated, use one of the following:
1. Cementitious Patching Mortar: Packaged, dry mix complying with ASTM C 928.
2. Polymer-Modified, Cementitious Patching Mortar: Packaged, dry mix complying with ASTM C 928, that contains a non-redispersible latex additive as either a dry powder or a separate liquid that is added during mixing.
3. Epoxy-Modified, Cementitious Patching Mortar: Mixture of water-insensitive epoxy adhesive, portland cement, and graded aggregates.

B. Overhead Patching Mortar: For overhead repairs, use patching mortar recommended by manufacturer for overhead use and as specified above.

C. Coarse Aggregate for Adding to Patching Mortar: Washed aggregate complying with ASTM C 33, Size No. 8, Class 5S. Add only as permitted by patching mortar manufacturer.

2.4 CONCRETE

A. Concrete Materials and Admixtures: Comply with Division 3 Section "Cast-in-Place Concrete."

B. Steel and Fiber Reinforcement and Reinforcement Accessories: Comply with Division 3 Section "Cast-in-Place Concrete."

C. Form-Facing Materials: Comply with Division 3 Section "Cast-in-Place Concrete."

D. Post-tensioned requirements: Comply with Division 3 Section "Unbonded Post-tensioned System."

E. Preplaced Aggregate: Washed aggregate complying with ASTM C 33, Class 5S, with 95 to 100 percent passing a 1-1/2-inchsieve, 40 to 80 percent passing a 1-inchsieve, 20 to 45 percent passing a 3/4-inchsieve, 0 to 10 percent passing a 1/2-inchsieve, and 0 to 2 percent passing a 3/8-inchsieve.

F. Preplaced Aggregate: Washed aggregate complying with ASTM C 33, Class 5S, with 100 percent passing a 1-1/2-inchsieve, 95 to 100 percent passing a 1-inchsieve, 40 to 80 percent passing a 3/4-inchsieve, 0 to 15 percent passing a 1/2-inchsieve, and 0 to 2 percent passing a 3/8-inchsieve.

G. Fine Aggregate for Grout Used with Preplaced Aggregate: Fine aggregate complying with ASTM C 33, but with 100 percent passing a No. 8sieve, 95 to 100 percent passing a No. 16sieve, 55 to 80 percent passing a No. 30sieve, 30 to 55 percent passing a No. 50sieve, 10 to 30 percent passing a No. 100sieve, 0 to 10 percent passing a No. 200sieve, and having a fineness modulus of 1.30 to 2.10.

H. Grout Fluidifier for Grout Used with Preplaced Aggregate: ASTM C 937.

I. Portland Cement for Grout Used with Preplaced Aggregate: ASTM C 150.

J. Pozzolans for Grout Used with Preplaced Aggregate: ASTM C 618.

2.5 MISCELLANEOUS MATERIALS

A. Epoxy Joint Filler: 2-component, semirigid, 100 percent solids, epoxy resin with a Shore A hardness of at least 80 per ASTM D 2240.

B. Epoxy Crack Injection Adhesive: ASTM C 881, Type I, Grade 1,.

C. Epoxy Capping Adhesive: Product manufactured for use with crack injection adhesive by same manufacturer.

D. Corrosion-Inhibiting Treatment Materials: Water-based solution of alkaline corrosion-inhibiting chemicals that penetrates concrete by diffusion and forms a protective film on steel reinforcement.

E. Polymer Overlay System:

1. Polymer overlay specified herein shall be complete systems of compatible materials. Components of systems shall include epoxy membrane, seal coating and all corrosion-inhibiting treatments, vapor reduction coatings, sealants, primers, flashing, aggregates and miscellaneous materials as required by the manufacturer to complete the system.
2. Polymer overlay systems shall meet the following slip resistance requirements:

    a. Coefficient of friction not less than 0.85 when tested under wet conditions.
    b. Variation in slip resistance test results not greater than +/- 0.10.

3. Epoxy Membrane Base Material: Epoxy adhesive complying with ASTM C 881, Type III.
4. Aggregates: Aggregate type, size and gradation as recommended by system manufacturer and as needed to meet or exceed slip resistance requirements. Comply with ACI 503.3.

    a. Oven-dried, washed, angular shaped flint, basalt or aluminum oxide aggregate applied in wear coats with minimum Mohs scale hardness as follows:

        1) Flint: 7 minimum
        2) Basalt: 7 minimum
        3) Aluminum oxide: 9 minimum

    b. Aluminum oxide powder applied in seal coat.

5. Seal coat must be resistant to ultra-violet degradation.
6. Special Manufacturer's & Installer's Warranty Period: Ten years from date of Substantial Completion

F. Polymer Sealer: Low-viscosity epoxy penetrating sealer recommended by manufacturer for application to exterior concrete traffic surfaces.

G. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

1. After fabricating, prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. After preparation, apply 1 coat of lead- and chromate-free, universal, modified-alkyd primer complying with FS TT-P-664 and 1 coat of alkyd-gloss enamel complying with FS TT-E-489.
3. After preparation, apply 2-coat high-performance coating system consisting of organic zinc-rich primer, complying with SSPC-Paint 20, at 2.5-mil dry film thickness and topcoat of high-build, 2-component, epoxy-polyamide, high-performance coating at 6-mil dry film thickness.

    a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    b. Products: Subject to compliance with requirements, provide one of the following:

        1) Carboline Company; Carboline 621 and 190 HB.
        2) PPG Industries, Inc.; Aquapon Zinc-Rich Primer 97-670 and High-Build Polyamide-Epoxy 97-131.
        3) Tnemec Company, Inc.; Tneme-Zinc 90-97 and Series 69 Hi-Build Epoxoline II.

H. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563hex nuts and flat washers; hot-dip galvanized to comply with ASTM A 153, Class C.

I. Postinstalled Anchors: Anchors as described below, with capability to sustain, without failure, a load equal to four times the load imposed, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Type: Chemical or Expansion anchors.
2. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.

2.6 MIXES

A. Mix products in clean containers according to manufacturer's written instructions.

1. Add clean silica sand and coarse aggregates to products only as recommended by manufacturer.
2. Do not add water, thinners, or additives unless recommended by manufacturer.
3. When practical, use manufacturer's premeasured packages to ensure that materials are mixed in proper proportions. When premeasured packages are not used, measure

ingredients using graduated measuring containers; do not estimate quantities or use shovel or trowel as unit of measure.

4. Do not mix more materials than can be used within recommended open time. Discard materials that have begun to set.

B. Mortar Scrub-Coat: Mix with enough water to provide a consistency of thick cream.

C. Dry-Pack Mortar: Mix with just enough liquid to form a damp cohesive mixture that can be squeezed by hand into a ball but is not plastic.

D. Concrete: Comply with Division 3 Section "Cast-in-Place Concrete."

E. Grout for Use with Preplaced Aggregate: Proportion according to ASTM C 938. Add grout fluidifier to mixing water followed by cementitious materials and then fine aggregate.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Notify Architect seven days in advance of dates when areas of delaminated concrete and reinforcing bars will be located.

B. Locate areas of delamination using hammer or chain drag sounding and mark boundaries. Mark areas for removal by simplifying and squaring off boundaries of delaminated areas as directed by Architect.

C. Locate at least three reinforcing bars using a pachometer, and drill test holes to determine depth of cover. Calibrate pachometer, using depth of cover measurements, and verify depth of cover in removal areas using pachometer.

3.2 PREPARATION

A. Protect people, motor vehicles, equipment, surrounding construction, Project site, plants, and surrounding buildings from injury resulting from concrete rehabilitation work.

1. Erect temporary protective covers over pedestrian walkways and at points of entrance and exit for people and vehicles that must remain in operation during course of concrete rehabilitation work. Construct covers of tightly fitted, 3/4-inchexterior-grade plywood supported at 16 incheso.c. and covered with asphalt roll roofing.
2. Protect adjacent equipment and surfaces by covering them with heavy polyethylene film and waterproof masking tape or a liquid strippable masking agent. If practical, remove items, store, and reinstall after potentially damaging operations are complete.
3. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
4. Dispose of runoff from wet operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

B. Shoring: Install temporary supports before beginning concrete removal.

C. Concrete Removal: Saw-cut perimeter of areas indicated for removal to a depth of at least 1/2 inch. Make cuts perpendicular to concrete surfaces and no deeper than cover on reinforcing. Remove loose and deteriorated concrete by breaking up and dislodging from reinforcing.

1. Remove concrete between cuts to a depth of at least 1/2 inch.
2. Where half or more of the perimeter of reinforcing bar is exposed, bond between reinforcing bar and surrounding concrete is broken, or reinforcing bar is corroded, remove concrete from entire perimeter of bar to provide at least a 3/4-inchclearance.
3. Test areas where concrete has been removed by tapping with hammer, and remove additional concrete until unsound concrete is completely removed.
4. Provide exposed aggregate surfaces with a profile of at least 1/8 inch that are approximately perpendicular or parallel to original concrete surfaces. At columns and walls, make top and bottom surfaces level.
5. Thoroughly clean removal areas of loose concrete, dust, and debris.

D. Reinforcing Bar Preparation: Remove loose and flaking rust from reinforcing bars by high-pressure water cleaning, abrasive blast cleaning, needle scaling, or wire brushing until only tightly bonded light rust remains.

1. Where section loss of reinforcing bar is more than 25 percent, or 20 percent in 2 or more adjacent bars, cut bars and remove and replace as directed by Architect. Remove additional concrete as necessary to provide at least a 3/4-inchclearance at existing and replacement bars. Splice replacement bars to existing bars according to ACI 318, by lapping, welding, or using mechanical couplings.

E. Preparation of Floor Joints for Repair: Saw-cut joints full width to edges of spalls and to a depth of at least 3/4 inch. Clean out debris and loose concrete; vacuum or blow clear with compressed air.

F. Surface Preparation for Corrosion-Inhibiting Treatment: Clean concrete by low-pressure water cleaning, detergent scrubbing, or sand blasting to remove dirt, oils, films, and other materials detrimental to treatment application. Allow surface to dry before applying corrosion-inhibiting treatment.

G. Preparation for Polymer Overlays:

1. Coordinate surface preparation with the surface preparation for the corrosion-inhibiting treatment and vapor reduction coating, as applicable.
2. Remove delaminated material and deteriorated concrete surface material. Roughen surface of concrete by sand blasting, shot blasting, scarifying, needle scaling, high-pressure water jetting, scabbling, flame blasting, or milling to produce a surface profile matching CSP 4, 5 or 6 per ICRI 03732, as required to meet the requirements of the selected polymer overlay. Sweep and vacuum roughened surface to remove debris followed by low-pressure water cleaning.
3. Meet with the testing agency and manufacturer's representative to approve the surface preparation and to agree on cracks to receive epoxy joint filler. All static cracks that exceed the width limit per the manufacturer's written instructions shall receive epoxy joint filler. Fill cracks with oven-dried sand before applying the epoxy joint filler per the manufacturer's requirements. After application of the epoxy joint filler, broadcast a dry silica sand to refusal evenly over the crack.

4. All dynamic cracks, construction joints, control joints, cove joints, joints around floor drains and joints around penetrations shall be prepared to receive sealant. After installation of the polymer overlay install sealant per Division 7 section "Garage Waterproofing Systems".

H. Surface Preparation for Sealers: Clean concrete by shot blasting, low-pressure water cleaning, or detergent scrubbing to remove dirt, oils, films, and other materials detrimental to sealer application. Produce a surface profile matching CSP 1 – 3 per ICRI 03732

3.3 APPLICATION

A. Epoxy-Modified, Cementitious Bonding and Anticorrosion Agent: Apply to reinforcing bars and concrete by brush or hopper spray according to manufacturer's written instructions. Apply to reinforcing bars in two coats, allowing first coat to dry two to three hours before applying second coat. Allow to dry before placing patching mortar or concrete.

B. Epoxy Bonding Agent: Apply to concrete by brush, roller, or spray according to manufacturer's written instructions, leaving no pinholes or other uncoated areas. Apply patching mortar or concrete while epoxy is still tacky. If bonding agent dries, recoat before placing patching mortar or concrete.

C. Mortar Scrub-Coat: Dampen repair area and surrounding concrete 6 inches beyond repair area. Remove standing water and apply scrub-coat with a brush, scrubbing it into surface and thoroughly coating repair area. If scrub-coat dries, recoat before applying patching mortar or concrete.

D. Patching Mortar: Unless otherwise recommended by manufacturer, apply as follows:

1. Wet substrate thoroughly and then remove standing water. Scrub a slurry of neat patching mortar mixed with latex bonding agent into substrate, filling pores and voids.
2. Place patching mortar by troweling toward edges of patch to force intimate contact with edge surfaces. For large patches, fill edges first and then work toward center, always troweling toward edges of patch. At fully exposed reinforcing bars, force patching mortar to fill space behind bars by compacting with trowel from sides of bars.
3. For vertical and overhead patching, place material in lifts of not more than 1 inch nor less than 1/8 inch. Do not feather edge.
4. After each lift is placed, consolidate material and screed surface.
5. Where multiple lifts are used, score surface of lifts to provide a rough surface for application of subsequent lifts. Allow each lift to reach final set before placing subsequent lifts.
6. Allow surfaces of lifts that are to remain exposed to become firm and then finish to a rough surface with a broom or burlap drag.
7. Wet-cure cementitious patching materials, including polymer-modified, cementitious patching materials, for not less than seven days by water-fog spray or water-saturated absorptive cover.

E. Dry-Pack Mortar: Use for deep cavities and where indicated. Place according to manufacturer's written instructions and as follows:

1. Provide forms where necessary to confine patch to required shape.

2. Wet substrate and forms thoroughly and then remove standing water.
3. Place dry-pack mortar into cavity by hand, and compact into place with a hardwood drive stick and mallet or hammer. Do not place more material at a time than can be properly compacted. Continue placing and compacting until patch is approximately level with surrounding surface.
4. After cavity is filled and patch is compacted, trowel surface to match profile and finish of surrounding concrete. A thin coat of patching mortar may be troweled into the surface of patch to help obtain required finish.
5. Wet-cure patch for not less than seven days by water-fog spray or water-saturated absorptive cover.

F. Concrete: Place according to Division 3 Section "Cast-in-Place Concrete" and as follows:

1. Apply epoxy-modified, cementitious bonding and anticorrosion agent or epoxy bonding agent to reinforcing and concrete substrate.
2. Use vibrators to consolidate concrete as it is placed.
3. At unformed surfaces, screed concrete to produce a surface that when finished with patching mortar will match required profile and surrounding concrete.
4. Where indicated place concrete by form and pump method.

    a. Design and construct forms to resist pumping pressure in addition to weight of wet concrete. Seal joints and seams in forms and junctions of forms with existing concrete.
    b. Pump concrete into place, releasing air from forms as concrete is introduced. When formed space is full, close air vents and pressurize to 14 psi.

5. Wet-cure concrete for not less than seven days by leaving forms in place or keeping surfaces continuously wet by water-fog spray or water-saturated absorptive cover.
6. Fill placement cavities with dry-pack mortar and repair voids with patching mortar. Finish to match surrounding concrete.

G. Grouted Preplaced Aggregate Concrete: Use for column and wall repairs and where indicated. Place as follows:

1. Design and construct forms to resist pumping pressure in addition to weight of wet grout. Seal joints and seams in forms and junctions of forms with existing concrete.
2. Apply epoxy-modified, cementitious bonding and anticorrosion agent or epoxy bonding agent to reinforcing and concrete substrate.
3. Place aggregate in forms, consolidating aggregate as it is placed. Pack aggregate into upper areas of forms to achieve intimate contact with concrete surfaces.
4. Fill forms with water to thoroughly dampen aggregate and substrates. Drain water from forms before placing grout.
5. Pump grout into place at bottom of preplaced aggregate, forcing grout upward. Release air from forms at top as grout is introduced. When formed space is full and grout flows from air vents, close vents and pressurize to 14 psi.
6. Wet-cure concrete for not less than seven days by leaving forms in place or keeping surfaces continuously wet by water-fog spray or water-saturated absorptive cover.
7. Repair voids with patching mortar and finish to match surrounding concrete.

H. Epoxy Joint Filler: Install in nonmoving floor joints where indicated.

1. Install filler to a depth of at least 3/4 inch. Use fine silica sand no more than 1/4 inch deep to close base of joint. Do not use sealant backer rods or compressible fillers below joint filler.
2. Install filler so that when cured, it is flush at top surface of adjacent concrete. If necessary, overfill joint and remove excess when filler has cured.

I. Epoxy Crack Injection: Comply with manufacturer's written instructions and the following:

1. Clean areas to receive capping adhesive of oil, dirt, and other substances that would interfere with bond, and clean cracks with oil-free compressed air or low-pressure water to remove loose particles.
2. Place injection ports as recommended by epoxy manufacturer, spacing no farther apart than thickness of member being injected. Seal injection ports in place with capping adhesive.
3. Seal cracks at exposed surfaces with a ribbon of capping adhesive at least 1/4 inch thick by 1 inch wider than crack.
4. Inject cracks wider than 0.003 inch to the full depth of the crack.
5. Inject epoxy adhesive, beginning at widest part of crack and working toward narrower parts. Inject adhesive into ports to refusal, capping adjacent ports when they extrude epoxy. Cap injected ports and inject through adjacent ports until crack is filled.
6. After epoxy adhesive has set, remove injection ports and grind surfaces smooth.

J. Corrosion-Inhibiting Treatment: Apply by brush, roller, or airless spray in two coats at manufacturer's recommended application rate. Remove film of excess treatment by high-pressure washing before patching treated concrete or applying a sealer or overlay.

1. Apply to the following: Supported slabs that receive traffic deck membrane.
2. Application rates: rates are for bidding purposes and are to be confirmed in the field using a 100 sf mockup

    a. 1st coat: 0.5 gal. minimum per 100 sf (200 sq. ft. maximum per gal.)
    b. 2nd coat: 0.5 gal. minimum per 100 sf (200 sq. ft. maximum per gal.)

K. Polymer Overlay (Epoxy Traffic Deck Membrane): Apply according to ACI 503.3, manufacturer's written instructions and the following:

1. Prior to application of mockups and each general application of polymer overlay perform testing to confirm that the deck surface is dry at time of application according to ASTM D4263, Standard Test Method for Indicating Moisture in Concrete. If testing indicates presence of moisture, allow adequate drying time and retest. Notify the Architect and manufacturer's representative if presence of moisture remains after adequate drying time.
2. Prior to general application, install and test two 4'x4' mockups for each polymer overlay system and each substrate. Apply a vapor reduction coating prior to polymer overlay if testing indicates a consistent presence of moisture in the slab. Mockups shall be used to verify preparation procedures, installation procedures, adhesion, slip resistance, and acceptable appearance. Proceed with general application after field quality-control test and inspection reports confirm compliance with requirements indicated and Architect and manufacturer's representative provide written approval. When applicable, the manufacturer's representative must provide written approve for the use of a vapor reduction coating in the general application.
3. Provide a grid system marked on the deck surface to designate the area for which a container of material must be used evenly applied to obtain the desired average dry mil

film thickness. A wet mil gauge shall also be used to randomly verify that mil thickness at application is consistent with system manufacturer's recommendations.

4. Broadcast clean, dry aggregate into wear coats and mix slip resistant powder into seal coat as needed to meet slip resistance requirements.
5. Application shall be by squeegee, roller and power sprayer.
6. Apply to the following: traffic-bearing surfaces, including parking areas and walksways.
7. Application rates: rates are for bidding purposes and shall be confirmed in the field based on the results of the mockups.

    a. Primer: if a primer is recommended by the manufacturer, apply at 200 to 300 sq. ft. per gal. and adjust the rate of the remaining coats so the total effective application rate is not less than 8.167 gal. per 100 sf.
    b. 1st coat of epoxy: 2.5 gal. minimum per 100 sf (40 sq. ft. maximum per gal.)
    c. 1st broadcast of aggregate: 1.11 lbs. minimum per sq. ft. to excess
    d. 2nd coat of epoxy: 5 gal. minimum per 100 sf (20 sq. ft. maximum per gal.)
    e. 2nd broadcast of aggregate: 1.55 lbs. minimum per sq. ft. to excess
    f. Seal coat of epoxy: 0.67 gal. minimum per 100 sf (150 sq. ft. maximum per gal.).

8. All dynamic cracks, construction joints, control joints, cove joints, joints around floor drains and joints around penetrations shall be prepared and receive sealant per Division 7 section "Garage Waterproofing Systems" after installation of the polymer overlay.

L. Polymer Sealer: Apply by brush, roller, or airless spray at manufacturer's recommended application rate. Fill cracks that are not indicated to receive sealant with oven-dried sand before applying sealer. After application of sealer, broadcast a dry silica sand to refusal evenly over the surface at a rate of not less than 20 lbs./100 sq. ft.

1. Apply to traffic-bearing surfaces, including parking areas and walks.

M. Embedded galvanic anodes: Comply with manufacturer's written instructions and the following:

1. Anode layout:
    a. Anodes shall be installed in a grid pattern with a maximum spacing of 18 inches on center, in each direction. When possible, anodes shall be installed a minimum 4 inches away from reinforcing grid.
    b. Mark out location of rebar connections. If the anodes are to be individually connected, one rebar connection per anode is required. If the anodes are to be installed in series, two rebar connections per string of anodes are required with a maximum of 10 anodes per string.
    c. Installer shall submit anode layout to Architect for review prior to installation. Anode layout shall be completed by the manufacturer.
    d. Rebar Connection – Electrical connection shall be established per manufacturers requirements and verified by Owners testing agency. Do not damage rebar, prestressed tendons, or conduit when establishing electrical connection.

2. Rebar connections:

    a. Follow manufacturers written instructions for rebar connection.
    b. Utilize required tools provided by manufacturer to obtain rebar connection.

c. Proper connection and rebar continuity shall be verified between two rebar connections using a multi-meter verified by Owners testing agency. Maximum resistance between the two locations shall be less than 1 ohm.

3. Anode installation:

a. Areas to receive anodes shall be in a saturated-surface dry condition prior to anode placement.
b. Presoak anodes in a small volume of water for 10 to 30 minutes. Remove from water bath immediately prior to installation.
c. Complete wiring between the anodes and the rebar connections. Manufacturer shall provide anode layout with written instructions for installer.
d. After all anodes within the repair area are connected to the rebar, installer shall confirm resistivity of 1 ohm or less is provided prior to inspection by Owner's testing agency.
e. Once inspected and approved, fill repair area with appropriate repair mortar (or ready-mix concrete where applicable) and maintain minimum cover over the top of the anodes of 1 in.
f. Wet cure cement-based mortar(s) or cure with two coats of a membrane-forming concrete curing compound meeting the requirements of ASTM C309.
g. Protect area from traffic for 24 hours.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to sample materials and perform tests specified in Division 3 Section "Cast-in-Place Concrete" and as follows:

1. Patching Mortar, Packaged Mixes: 5 randomly selected samples for every 4 hours of placement or portion thereof. New samples shall be taken when conditions change, such as a change in shift, weather, temperature, etc. Test samples according to ASTM C 928.

2. Patching Mortar, Field Mixed: 5 randomly selected samples for every 4 hours of placement or portion thereof. New samples shall be taken when conditions change, such as a change in shift, weather, temperature, etc. Test samples for compressive strength according to ASTM C 109/C 109M.

3. Grouted Preplaced Aggregate: Tested for compressive strength of grout according to ASTM C 942.

a. Testing Frequency: 1 sample for each 25 cu. yd.of grout or fraction thereof, but not less than 1 sample for each day's work.

4. Epoxy Joint Filler: Core drilled samples to verify proper installation.

a. Testing Frequency: One sample for each 100 feetof joint filled.
b. Core size: ¾ inch diameter by 12 inches long.
c. Where samples are taken, fill holes with epoxy joint filler.

5. Epoxy Crack Injection: Core drilled samples to verify proper installation.

a. Testing Frequency: 3 samples from mockup and 1 sample for each 100 feetof crack injected.
b. Core size: ¾ inch diameter by 12 inches long.
c. Where samples are taken, fill holes with epoxy mortar.

6. Polymer Overlays: Perform field quality control per ACI 503.3 and as follows.

a. Confirm proper surface preparation.
b. Determine that moisture content of slab, relative humidity and temperature are within the acceptable range.
c. Confirm that polymer overlay is applied per ACI 503.3 and Manufacturer's requirements.
d. Confirm that the components of the polymer overlay are applied at a rate at least equal to that specified.
e. Pullout strength test to assure a minimum of 100 psi pullout strength of polymer overlay system.

1) Extent of Testing: Test mockups and completed polymer overlay as follows:

a) Perform 2 tests for each mockup.
b) Perform 6 tests for the first 10,000 square feet of polymer overlay for each type of polymer overlay and substrate.
c) Perform 1 test for each 10,000 square feet of polymer overlay thereafter, but not less than 1 test per floor.

f. Field Slip Resistance Testing: Field test polymer overlay slip resistance as follows:

1) Extent of Testing: Test mockups and completed polymer overlay as follows:

a) Perform 2 tests for each mockup.
b) Perform 6 tests for the first 10,000 square feet of polymer overlay for each type of polymer overlay.
c) Perform 1 test for each 10,000 square feet of polymer overlay thereafter, but not less than 1 test per floor.

2) Test Method: ANSI/NFSI B101.1 - Test Method for Measuring Wet Static Coefficient of Friction (SCOF) of Common Hard-Surface Floor Materials
3) Inspect polymer overlay for variations in aggregate distribution. Locate tests at areas with high density of aggregate and with low density of aggregate.

g. Repair polymer overlay damaged during testing by applying new polymer overlay following same procedures used originally. Ensure that original surfaces are clean and that new polymer overlay overlaps original polymer overlay.

7. Embedded Galvanic Anodes:

a. Testing Agency shall inspect installation for compliance and verify the electrical connection between the anodes and rebar as outlined in section 3.3.M above (random electrical resistivity check at 10% of anodes). Any discrepancies shall be reported in writing to the Architect.

END OF SECTION 039300

SECTION 040120.63 - MASONRY 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 SUMMARY

A. Section Includes:

1. Repairing masonry (brick and masonry units), including replacing units.
2. Removing abandoned anchors.
3. Painting steel uncovered during the work.

1.3 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."

1. Unit prices apply to authorized work covered by estimated quantities.
2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.4 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.

B. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.

C. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of masonry units to freezing and thawing.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to masonry repair including, but not limited to, the following:

a. Verify masonry repair specialist's personnel, equipment, and facilities needed to make progress and avoid delays.

b. Materials, material application, sequencing, tolerances, and required clearances.
c. Quality-control program.
d. Coordination with building occupants.

1.6 SEQUENCING AND SCHEDULING

A. Order sand and gray portland cement for colored mortar immediately after approval of mockups. Take delivery of and store at Project site enough quantity to complete Project.

B. Work Sequence: Perform masonry repair work in the following sequence, which includes work specified in this and other Sections:

1. Remove plant growth.
2. Inspect masonry for open mortar joints and point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean masonry.
5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
6. Repair masonry, including replacing existing masonry with new masonry materials.
7. Rake out mortar from joints to be repointed.
8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
10. Where water repellents are to be used on or near masonry work, delay application of these chemicals until after pointing and cleaning.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units according to "Masonry Unit Patching" Article. Patch holes in mortar joints according to Section 040120.64 "Masonry Repointing."

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include recommendations for product application and use. Include test data substantiating that products comply with requirements.

B. Shop Drawings:

1. Include plans, elevations, sections, and locations of replacement masonry units on the structure, showing relation of existing and new or relocated units.
2. Show provisions for expansion joints or other sealant joints.
3. Show provisions for flashing, lighting fixtures, conduits, and weep holes as required.
4. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.

C. Samples for Initial Selection: For the following:

1. Colored Mortar: Submit sets of mortar that will be left exposed in the form of sample mortar strips, 6 inches long by 1/4 inch wide, set in aluminum or plastic channels.

   a. Have each set contain a close color range of at least six Samples of different mixes of colored sands and cements that produce a mortar matching existing, cleaned mortar when cured and dry.
   b. Submit with precise measurements on ingredients, proportions, gradations, and source of colored sands from which each Sample was made.

2. Sand Types Used for Mortar: Minimum 8 oz. of each in plastic screw-top jars.
3. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of masonry representative of the range of masonry colors on the building.

   a. Have each set contain a close color range of at least six Samples of different mixes of patching compound that matches the variations in existing masonry when cured and dry.

4. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For the following:

1. Each type of unit to be used for replacing existing units. Include sets of Samples to show the full range of shape, color, and texture to be expected. For each type, provide straps or panels containing at least four masonry units. Include multiple straps for masonry unit with a wide range.
2. Each type of patching compound in the form of briquettes, at least 3 inches long by 1-1/2 inches wide. Document each Sample with manufacturer and stock number or other information necessary to order additional material.
3. Accessories: Each type of accessory and miscellaneous support.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For masonry repair specialist including field supervisors and workers and testing service.

B. Preconstruction Test Reports: For existing masonry units and mortar and replacement masonry units.

C. Quality-control program.

1.9 QUALITY ASSURANCE

A. Masonry Repair Specialist Qualifications: Engage an experienced masonry repair firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing masonry is insufficient experience for masonry repair work.

1. Field Supervision: masonry repair specialist firm shall maintain experienced full-time supervisors on Project site during times that masonry repair work is in progress.
2. Masonry Repair Worker Qualifications: When masonry units are being patched, assign at least one worker per crew who is trained and certified by manufacturer of patching compound to apply its products.

B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage.

C. Mockups: Prepare mockups of masonry repair to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.

1. Masonry Repair: Prepare sample areas for each type of masonry repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48 inches in least dimension. Construct sample areas in locations in existing walls where directed by Architect unless otherwise indicated. Demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:

   a. Replacement: Four masonry units replaced.
   b. Patching: Three small holes at least 1 inch in diameter for each type of masonry unit indicated to be patched.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on masonry units as follows:

1. Provide test specimens as indicated and representative of proposed materials and existing construction.
2. Replacement Masonry unit: Test each proposed type of replacement masonry unit according to sampling and testing methods in ASTM C 67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction).
3. Existing Masonry unit: Test each type of existing masonry unit indicated for replacement according to testing methods in ASTM C 67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove five existing units from locations designated by Architect. Take testing samples from these units.
4. Existing Mortar: Test according to ASTM C 295/C 295M, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength.

5. Temporary Patch: As directed by Architect, provide temporary materials followed by permanent repairs at locations from which existing samples were taken.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry units to Project site strapped together in suitable packs or pallets or in heavy-duty cartons and protected against impact and chipping.

B. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

E. Store sand where grading and other required characteristics can be maintained and contamination avoided.

F. Handle masonry units to prevent overstressing, chipping, defacement, and other damage.

1.12 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit masonry repair work to be performed according to product manufacturers' written instructions and specified requirements.

B. Temperature Limits, General: Repair masonry units only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for masonry repair unless otherwise indicated:

1. When air temperature is below 40 deg F, heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F.
2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for seven days after repair.

D. Hot-Weather Requirements: Protect masonry repairs when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain each type of material for repairing masonry (brick, glazed masonry unit, cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 MASONRY MATERIALS

A. Face Masonry unit: As required to complete masonry repair work.

1. Masonry unit Matching Existing: Units with colors, color variation within units, surface texture, size, and shape that match existing masonry work and with physical properties within 10 percent of those determined from preconstruction testing of selected existing units.

a. For existing masonry work that exhibits a range of colors or color variation within units, provide masonry that proportionally matches that range and variation rather than masonry that matches an individual color within that range.

2. Special Shapes:

a. Provide molded, 100 percent solid shapes for applications where core holes or "frogs" could be exposed to view or weather when in final position and where shapes produced by sawing would result in sawed surfaces being exposed to view.
b. Provide specially ground units, shaped to match patterns, for arches and where indicated.
c. Mechanical chopping or breaking masonry, or bonding pieces of masonry together by adhesive, are unacceptable procedures for fabricating special shapes.

3. Tolerances as Fabricated: According to tolerance requirements in ASTM C 216, Type FBX.

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or Type II, except Type III may be used for cold-weather construction; white or gray, or both where required for color matching of mortar.

1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Masonry Cement: ASTM C 91/C 91M.

D. Mortar Cement: ASTM C 1329/C 1329M.

E. Mortar Sand: ASTM C 144.

1. Exposed Mortar: Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
2. Colored Mortar: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.

F. Mortar Pigments: ASTM C 979/C 979M, compounded for use in mortar mixes, and having a record of satisfactory performance in masonry mortars.

G. Water: Potable.

2.4 MANUFACTURED REPAIR MATERIALS

A. Masonry Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching masonry.

1. Use formulation that is vapor and water permeable (equal to or more than the masonry unit), exhibits low shrinkage, has lower modulus of elasticity than masonry units being repaired, and develops high bond strength to all types of masonry.
2. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.
3. Formulate patching compound in colors and textures to match each masonry unit being patched. Provide sufficient number of colors to enable matching of the color, texture, and variation of each unit.

2.5 ACCESSORY MATERIALS

A. Setting Buttons and Shims: Resilient plastic, nonstaining to masonry, sized to suit joint thicknesses and bed depths of masonry units, less the required depth of pointing materials unless removed before pointing.

B. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.

C. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer according to MPI #23 (surface-tolerant, anticorrosive metal primer) or SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.

1. Surface Preparation: Use coating requiring no better than SSPC-SP 2, "Hand Tool Cleaning" or SSPC-SP 3, "Power Tool Cleaning" surface preparation according to manufacturer's literature or certified statement.
2. VOC Limit: Use coating with a VOC content of 400 g/L or less.

D. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.
2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.

5. Do not use products or tools that could leave residue on surfaces.

2.6 MORTAR MIXES

A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.

1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.

C. Do not use admixtures in mortar unless otherwise indicated.

D. Mixes: Mix mortar materials in the following proportions:
1. Rebuilding (Setting) Mortar by Property: ASTM C 270, Property Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime, masonry cement or mortar cement.
2. Pigmented, Colored Mortar: Add mortar pigments to produce exposed, setting (rebuilding) mortar of colors required.

PART 3 - EXECUTION

3.1 PROTECTION

A. Prevent mortar from staining face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
2. Keep wall area wet below rebuilding and repair work to discourage mortar from adhering.
3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.

B. Remove gutters and downspouts and associated hardware adjacent to masonry and store during masonry repair. Reinstall when repairs are complete.

1. Provide temporary rain drainage during work to direct water away from building.

3.2 MASONRY REPAIR, GENERAL

A. Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from 20 feet away by Architect.

3.3 ABANDONED ANCHOR REMOVAL

A. Remove abandoned anchors, brackets, wood nailers, and other extraneous items no longer in use unless indicated to remain.

1. Remove items carefully to avoid spalling or cracking masonry.
2. Notify Architect before proceeding if an item cannot be removed without damaging surrounding masonry. Do the following where directed:

    a. Cut or grind off item approximately 3/4 inch beneath surface and core drill a recess of same depth in surrounding masonry as close around item as practical.
    b. Immediately paint exposed end of item with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended dry film thickness per coat. Keep paint off sides of recess.

3. Patch hole where each item was removed unless directed to remove and replace masonry unit.

3.4 MASONRY REMOVAL AND REPLACEMENT

A. Remove masonry units that are damaged, spalled, or deteriorated or are to be reused. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

1. When removing single masonry units, remove material from center of masonry unit and work toward outside edges.

B. Support and protect remaining masonry that surrounds removal area.

C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

D. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.

E. Remove in an undamaged condition as many whole masonry units as possible.

1. Remove mortar, loose particles, and soil from masonry units by cleaning with hand chisels, brushes, and water.
2. Remove sealants by cutting close to masonry units with utility knife and cleaning with solvents.
3. Store masonry units for reuse. Store off ground, on skids, and protected from weather.
4. Deliver cleaned masonry units not required for reuse to Owner unless otherwise indicated.

F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for masonry unit replacement.

G. Replace removed damaged masonry units with other removed masonry units in good condition, where possible, or with new masonry units matching existing masonry units. Do not use broken units unless they can be cut to usable size.

H. Install replacement masonry units into bonding and coursing pattern of existing masonry units. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.

1. Maintain joint width for replacement units to match existing joints.
2. Use setting buttons or shims to set units accurately spaced with uniform joints.

I. Lay replacement masonry units with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with enough mortar to fill head joints and shove into place. Wet both replacement and surrounding masonry units that have ASTM C 67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.

1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing masonry work.
2. Rake out mortar used for laying masonry units before mortar sets according to Section 040120.64 "Masonry Repointing." Point at same time as repointing of surrounding area.
3. When mortar is hard enough to support units, remove shims and other devices interfering with pointing of joints.

J. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.

1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

3.5 PAINTING STEEL UNCOVERED DURING THE WORK

A. Notify Architect if steel is exposed during masonry removal. Where Architect determines that steel is structural, or for other reasons cannot be totally removed, prepare and paint it as follows:

1. Surface Preparation: Remove paint, rust, and other contaminants according to SSPC-SP 2, "Hand Tool Cleaning" or SSPC-SP 3, "Power Tool Cleaning", as applicable to comply with paint manufacturer's recommended preparation.
2. Antirust Coating: Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).

B. If on inspection and rust removal, the thickness of a steel member is found to be reduced from rust by more than 1/16 inch, notify Architect before proceeding.

3.6 MASONRY UNIT PATCHING

A. Patch the following masonry units unless another type of repair or replacement is indicated:

1. Units with holes.

B. Remove and replace existing patches unless otherwise indicated or approved by Architect.

C. Patching Masonry units:

1. Remove loose material from masonry surface. Carefully remove additional material so patch does not have feathered edges but has square or slightly undercut edges on area to be patched and is at least 1/4 inch thick, but not less than recommended in writing by patching compound manufacturer.
2. Mask adjacent mortar joint or rake out for repointing if patch extends to edge of masonry unit.
3. Mix patching compound in individual batches to match each unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.
4. Rinse surface to be patched and leave damp, but without standing water.
5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
6. Place patching compound in layers as recommended in writing by patching compound manufacturer, but not less than 1/4 inch or more than 2 inches thick. Roughen surface of each layer to provide a key for next layer.
7. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of masonry unit. Shape and finish surface before or after curing, as determined by testing, to best match existing masonry unit.
8. Keep each layer damp for 72 hours or until patching compound has set.
9. Remove and replace patches with hairline cracks or that show separation from masonry units at edges, and those that do not match adjoining masonry units in color or texture.

3.7 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.

1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

B. Clean adjacent nonmasonry surfaces. Use detergent and soft brushes or cloths.

C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

D. Remove masking materials, leaving no residues that could trap dirt.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.

B. Notify inspectors in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

3.9 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property.

B. Masonry Waste: Remove masonry waste and legally dispose of off Owner's property.

END OF SECTION 040120.63

SECTION 040120.64 - MASONRY REPOINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Repointing joints with mortar.

1.3 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."

1. Unit prices apply to authorized work covered by estimated quantities.
2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.4 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to repointing masonry including, but not limited to, the following:

a. Verify masonry repointing specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.
c. Quality-control program.
d. Coordination with building occupants.

1.6 SEQUENCING AND SCHEDULING

A. Order sand and gray portland cement for pointing mortar immediately after approval of mockups. Take delivery of and store at Project site enough quantity to complete Project.

B. Work Sequence: Perform masonry repointing work in the following sequence, which includes work specified in this and other Sections:

1. Remove plant growth.
2. Inspect masonry for open mortar joints and permanently or temporarily point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean masonry.
5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
6. Repair masonry, including replacing existing masonry with new masonry materials.
7. Rake out mortar from joints to be repointed.
8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units according to Section 040120.63 "Masonry Repair." Patch holes in mortar joints according to Section 3.4.

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include recommendations for product application and use. Include test data substantiating that products comply with requirements.

B. Shop Drawings:

1. Include plans, elevations, sections, and locations of repointing work on the structure.
2. Show provisions for expansion joints or other sealant joints.
3. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.

C. Samples for Initial Selection: For the following:

1. Pointing Mortar: Submit sets of mortar for pointing in the form of sample mortar strips, 6 inches long by 1/4 inch wide, set in aluminum or plastic channels.

    a. Have each set contain a close color range of at least six Samples of different mixes of colored sands and cements that produce a mortar matching existing, cleaned mortar when cured and dry.
    b. Submit with precise measurements on ingredients, proportions, gradations, and source of colored sands from which each Sample was made.

2. Sand Type Used for Pointing Mortar: Minimum 8 oz. of each in plastic screw-top jars.
3. Sealant materials.
4. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For the following:

1. Each type, color, and texture of pointing mortar in the form of sample mortar strips, 6 inches long by 1/4 inch wide, set in aluminum or plastic channels.

   a. Include with each Sample a list of ingredients with proportions of each. Identify sources, both supplier and quarry, of each type of sand and brand names of cementitious materials and pigments if any.

2. Sealant materials.
3. Accessories: Each type of accessory and miscellaneous support.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For masonry repointing specialist including field supervisors and workers and testing service.

B. Preconstruction Test Reports: For existing masonry units and mortar and replacement masonry units.

C. Quality-control program.

1.9 QUALITY ASSURANCE

A. Masonry Repointing Specialist Qualifications: Engage an experienced masonry repointing firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing masonry is insufficient experience for masonry repointing work.

1. Field Supervision: Masonry repointing specialist firms shall maintain experienced full-time supervisors on Project site during times that masonry repointing work is in progress.

B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage.

C. Mockups: Prepare mockups of brick and glazed block masonry repointing to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Repointing: Rake out joints in two separate areas, each approximately 36 inches high by 48 inches wide for each type of repointing required, i.e. brick and glazed block, and repoint the areas.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on masonry units as follows:

1. Provide test specimens as indicated and representative of proposed materials and existing construction.
2. Existing Masonry: Test each type of existing masonry indicated for repointing according to testing methods in ASTM C 67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove five existing units from locations designated by Architect. Take testing samples from these units.
3. Existing Mortar: Test according to ASTM C 295/C 295M, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength.
4. Temporary Patch: As directed by Architect, provide temporary materials followed by permanent repairs at locations from which existing samples were taken.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

D. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.12 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit repointing work to be performed according to product manufacturers' written instructions and specified requirements.

B. Temperature Limits, General: Repoint mortar joints only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for mortar-joint pointing unless otherwise indicated:

1. When air temperature is below 40 deg F, heat mortar ingredients and existing masonry walls to produce temperatures between 40 and 120 deg F.
2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for seven days after pointing.

D. Hot-Weather Requirements: Protect mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain each type of material for repointing masonry (cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or Type II, except Type III may be used for cold-weather construction; white or gray, or both where required for color matching of mortar.

1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Masonry Cement: ASTM C 91/C 91M.

D. Mortar Cement: ASTM C 1329/C 1329M.

E. Mortar Sand: ASTM C 144.

1. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
2. Color: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.

F. Mortar Pigments: ASTM C 979/C 979M, compounded for use in mortar mixes, and having a record of satisfactory performance in masonry mortars.

G. Water: Potable.

2.3 ACCESSORY MATERIALS

A. Sealant Materials:

1. Sealant manufacturer's standard elastomeric sealant(s) of base polymer and characteristics indicated below and according to applicable requirements in Section 079200 "Joint Sealants", section 2.2.3.

2. Colors: Provide colors of exposed sealants to match colors of mortar adjoining installed sealant unless otherwise indicated.
3. Ground-Mortar Aggregate: Custom crushed and ground pointing mortar sand or existing mortar retrieved from joints. Grind to a particle size that matches the adjacent mortar aggregate and color. Remove all fines passing the [**No. 100**] <**Insert number**> sieve.

B. Joint-Sealant Backing:

1. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) or Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
2. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended in writing by sealant manufacturer for preventing sealant from adhering to rigid, inflexible, joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

C. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.

D. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.
2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could leave residue on surfaces.

2.4 MORTAR MIXES

A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again, adding only enough water to produce a damp, unworkable mix that retains its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.

B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.

1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.

C. Do not use admixtures in mortar unless otherwise indicated.

D. Mixes: Mix mortar materials in the following proportions:
   1. Pointing Mortar by Property: ASTM C 270, Property Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime masonry cement or mortar cement. Add mortar pigments to produce mortar colors required.

PART 3 - EXECUTION

3.1 PROTECTION

A. Prevent mortar from staining face of surrounding masonry and other surfaces.

   1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
   2. Keep wall area wet below pointing work to discourage mortar from adhering.
   3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.

B. Remove gutters and downspouts and associated hardware adjacent to masonry and store during masonry repointing. Reinstall when repointing is complete.

   1. Provide temporary rain drainage during work to direct water away from building.

3.2 MASONRY REPOINTING, GENERAL

A. Appearance Standard: Repointed surfaces are to have a uniform appearance as viewed from 20 feet away by Architect.

3.3 REPOINTING MASONRY

A. Rake out and repoint joints to the following extent:

   1. All joints in areas indicated.
   2. Joints indicated as sealant-filled joints.
   3. Joints at locations of the following defects:

      a. Holes and missing mortar.
      b. Cracks that can be penetrated 1/4 inch or more by a knife blade 0.027 inch thick.
      c. Cracks 1/16 inch or more in width and of any depth.
      d. Hollow-sounding joints when tapped by metal object.
      e. Eroded surfaces 1/4 inch or more deep.
      f. Deterioration to point that mortar can be easily removed by hand, without tools.
      g. Joints filled with substances other than mortar.

B. Rake out joints as follows, according to procedures demonstrated in approved mockup:

1. Remove mortar from joints to depth of 2 times joint width, but not less than 3/4 inch or not less than that required to expose sound, unweathered mortar. Do not remove unsound mortar more than 2 inches deep; consult Architect for direction.
2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.

C. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

D. Pointing with Mortar:

1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer, and allow it to become thumbprint hard before applying next layer.
3. After deep areas have been filled to same depth as remaining joints, point joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
6. Hairline cracking within mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

E. Pointing with Sealant: Comply with Section 079200 "Joint Sealants." and as follows:

1. After raking out, keep joints dry and free of mortar and debris.
2. Clean and prepare joint surfaces. Prime joint surfaces unless sealant manufacturer recommends against priming. Do not allow primer to spill or migrate onto adjoining surfaces.
3. Fill sealant joints with specified joint sealant.

    a. Install cylindrical sealant backing beneath the sealant. Where space is insufficient for cylindrical sealant backing, install bond-breaker tape.
    b. Install sealant using only proven installation techniques that ensure that sealant is deposited in a uniform, continuous ribbon, without gaps or air pockets, and with complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding masonry and matching the contour of adjoining mortar joints.
    c. Install sealant as recommended in writing by sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead:

1) Fill joints to a depth equal to joint width, but not more than 1/2 inch deep or less than 1/4 inch deep.

d. Tool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant from surfaces adjacent to joint.

e. Sanded Joints: Immediately after first tooling, apply ground-mortar aggregate to sealant, gently pushing aggregate into the surface of sealant. Lightly retool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant and aggregate from surfaces adjacent to joint.

f. Do not allow sealant to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces, particularly rough textures. Remove excess and spillage of sealant promptly as the work progresses. Clean adjoining surfaces by the means necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes, as demonstrated in an approved mockup.

F. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.4 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.

1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

B. Clean adjacent nonmasonry surfaces. Use detergent and soft brushes or cloths.

C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

D. Remove masking materials, leaving no residues that could trap dirt.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage qualified testing agency to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.

B. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.

C. Notify inspectors in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

END OF SECTION 040120.64

SECTION 055000 - METAL FABRICATIONS FOR GARAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Shelf angles.
   2. Abrasive metal nosings treads and thresholds.
   3. Pedestrian guardrail / vehicular barrier.
   4. Barrier cable system

B. Products furnished, but not installed, under this Section include the following:
   1. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

C. Related Sections include the following:

   1. Division 3 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, wedge-type inserts and other items indicated to be cast into concrete.
   2. Division 5 Section "Pipe and Tube Railings."

1.3 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

B. Performance Design of Barrier Cable System:
   1. The system shall be performance designed and constructed in conformance with the Post-Tension Institutes' requirements:
      a. Post-Tension Manual - Sixth Edition
      b. Specification for Seven-Wire Prestressing Steel Strand for Barrier Cable Applications
      c. Technical Notes, Issue 14, December 2004 – Design of Prestressed Barrier Cable Systems

2. Provide calculations and shop drawings for the system that are signed and sealed by a professional engineer registered in the state that the project is located. The barrier cable system and the supporting precast concrete shall be designed to resist the maximum of the following loads or combination thereof:
   a. Barrier cable forces that occur during a vehicle impact.
   b. Barrier cable forces that occur during pedestrian guardrail loading.
   c. Barrier cable forces that are required to prevent sag of the cables.

3. The drawings show general requirements for intermediate and end supports. Modify the location, type and quantity of supports as required to provide a complete system that is coordinated with the geometrical constraints of the structure and meets the loading and cable spacing requirements.

4. The installer shall be certified by PTI for the installation of Prestressed Barrier Cable Systems.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Metal nosings and treads.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

   1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
   2. Provide templates for anchors and bolts specified for installation under other Sections.
   3. Barrier Cable system.

1.5 INFORMATIONAL SUBMITTALS

A. Samples for Verification: For each type and finish of extruded nosing and tread.

B. Welding certificates.

C. Qualification Data: For professional engineer.

1.6 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:

   1. AWS D1.1, "Structural Welding Code--Steel."
   2. AWS D1.2, "Structural Welding Code--Aluminum."
   3. AWS D1.3, "Structural Welding Code--Sheet Steel."

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
2. Provide allowance for trimming and fitting at site.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.3 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

C. Steel Tubing: ASTM A 500, cold-formed steel tubing.

D. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

E. Cast Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.

F. Refer to Division 5 Section "Structural Steel" corrosion resistant steel materials.

2.4 NONFERROUS METALS

A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.

B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

D. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.5 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 2.

D. Anchor Bolts: ASTM F 1554, Grade 36, hot-dipped galvanized.

1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

E. Eyebolts: ASTM A 489.

F. Machine Screws: ASME B18.6.3.

G. Lag Bolts: ASME B18.2.1.

H. Wood Screws: Flat head, ASME B18.6.1.

I. Plain Washers: Round, ASME B18.22.1.

J. Lock Washers: Helical, spring type, ASME B18.21.1.

K. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

L. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material for Anchors in Exterior Locations: Alloy Group 2 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

2.6 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

C. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20. The galvanizing repair paint must match the color of the hot-dip galvanized finish; provide a mockup for confirmation.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

F. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2.7 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.8 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.
2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.

C. Galvanize shelf angles located in exterior walls.

D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.9 ABRASIVE METAL NOSINGS TREADS AND THRESHOLDS

A. Extruded Units: Aluminum, with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in sizes and configurations indicated and in lengths necessary to accurately fit openings or conditions.

1. Available Manufacturers:

   a. ACL Industries, Inc.
   b. American Safety Tread Co., Inc.
   c. Amstep Products.
   d. Armstrong Products, Inc.
   e. Balco Inc.
   f. Granite State Casting Co.
   g. Wooster Products Inc.

2. Provide ribbed units, with abrasive filler strips projecting 1/16 inch above aluminum extrusion.

B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

C. Drill for mechanical anchors and countersink. Locate not more than 4 inches from ends and not more than 12 inches o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by manufacturer.

1. Provide 2 rows of holes for units more than 5 inches wide, with 2 holes aligned at ends and intermediate holes staggered.

D. Apply bituminous paint to concealed bottoms, sides, and edges of cast-metal units set into concrete.

2.10 BARRIER CABLE SYSTEM

A. General: 7-wire strand; ASTM A416; minimum ultimate tensile strength of 270,000 psi; 1/2 inch strand diameter.

B. The barrier cables shall have a galvanized coating conforming to ASTM A475. Anchorage components shall be hot dip galvanized conforming to ASTM A153.

2.11 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.12 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

2. Zinc high spots, such as a metal drip line, should be removed by cleaning with hand or power tools as described in SSPC Surface Preparation Specification 2 or 3. The zinc should be removed until it is level with the surrounding area, taking care that the base coating is not removed by the cleaning methods.

3. After cleaning, the surface shall be inspected for conformance to the required zinc thickness in accordance with ASTM A 123/A 123M or A 153/A 153M utilizing a magnetic-field-type thickness instrument in accordance with ASTM E 376. Any item falling below the required zinc thickness, before or after removal of any high spots, shall be repaired in accordance with ASTM A 780.

B. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime unless primers specified in Section 09960 "High-Performance Coatings" are indicated.

2.13 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Mechanical Finish: AA-M12 (Mechanical Finish: nonspecular as fabricated).

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

D. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
1. Color: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING NOSINGS, TREADS, AND THRESHOLDS

A. Center nosings on tread widths.

B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.

C. Seal thresholds exposed to exterior with elastomeric sealant complying with Division 7 Section "Joint Sealants" to provide a watertight installation.

3.3 INSTALLING BARRIER CABLE SYSTEM

A. Install barrier cable system per manufacturer's written instructions. Effective tension in cables shall be as required by the contractor's performance design, however shall not be less than the following:

1. Cables between 16" and 29" above slab: 5 kips
2. Remaining cables 3 kips

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint that are specified in Division 9 painting Sections. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Use applicators and techniques to provide a minimum 2.0-mil dry film thickness that matches the color and texture of the shop paint.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.5 SHOP & FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections.

B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Shop & field welds will be subject to tests and inspections.

1. Magnetic Particle Inspection: ASTM E 709.
2. Ultrasonic Inspection: ASTM E 164.
3. Perform test on 100% of all full penetration welds, 25% of all partial penetration and field fillet welds and 5% of all shop welds using magnetic particle method or ultrasonic method. The balance of all field welds will be visually inspected according to AWS D1.1. Engineer may reduce frequency of tests when test results are consistently within acceptable range.
4. Cracks or zones of incomplete fusion or penetration will not be accepted.

D. Testing agency will report test results promptly and in writing to Contractor and Architect.

E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

END OF SECTION 055000

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Steel pipe and tube railings.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters, including finish.
2. Fittings and brackets.
3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.

a. Show method of connecting and finishing members at intersections.

D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

E. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E894 and ASTM E935.

F. Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F,material surfaces.

2.3 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.4 STEEL AND IRON

A. Tubing: ASTM A500 (cold formed) or ASTM A513.

B. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

1. Provide galvanized finish for exterior installations and where indicated.

C. Plates, Shapes, and Bars: ASTM A36/A36M.

2.5 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B633 or ASTM F1941, Class Fe/Zn 5 for zinc coating.
2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329 for zinc coating.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.

D. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.

2.6 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

E. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.

F. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.

G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

H. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.7 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

J. Form Changes in Direction as Follows:

1. As detailed.

K. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

L. Close exposed ends of railing members with prefabricated end fittings.

M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

P. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

Q. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.8 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
2. Comply with ASTM A123/A123M for hot-dip galvanized railings.
3. Comply with ASTM A153/A153M for hot-dip galvanized hardware.
4. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
5. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

D. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

E. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.

1. Color: Match existing railings at site.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.3 ANCHORING POSTS

A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Leave anchorage joint exposed with 1/8-inch buildup, sloped away from post.

C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

3.4 ATTACHING RAILINGS

A. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends.

3.5 ADJUSTING AND CLEANING

A. Clean by washing thoroughly with clean water and soap and rinsing with clean water.

B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780/A780M.

3.6 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 055213

SECTION 079020 - GARAGE WATERPROOFING SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section includes the following:

1. Protective concrete sealer system.
2. Elastomeric traffic deck coating system.
3. Vertical membrane system
4. Slab and deck control joint sealant system.
5. Structural expansion joint system.

1.2 RELATED WORK

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

B. Related Sections include the following:

1. Division 3 Section "Cast-in-place Concrete".
2. Division 3 Sections "Concrete Rehabilitation".
3. Division 32 Section "Pavement Markings".

1.3 ACTION SUBMITTALS

A. General: Submit the following in accordance with the Conditions of the Contract and Division 1 Specification sections.

B. Product Data: For each product indicated.

C. A detailed statement describing the deck waterproofing system to be installed, as well as the installation methods to be employed, shall be submitted for approval prior to installation. Literature, details, samples, shop drawings, warranties, etc., shall be included in the submittal as requested.

1.4 INFORMATIONAL SUBMITTALS

A. A manufacturer's written acceptance and approval of the intended system applicator shall be required.

B. Qualification Data: For Installer and testing agency.

C. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.

D. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that products comply with requirements.

E. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of waterproofing systems required for this Project.

B. Source Limitations: Obtain each type of product through one source from a single manufacturer.

C. A site inspection shall be made by applicator prior to commencing installation of the system for purposes of reviewing related conditions affecting performance requirements of this specification.

D. All products described in this section must be used with adequate ventilation and personal protection. Refer to the Material Safety Data Sheet which accompanies each product shipment for detailed health and safety information prior to use.

E. At Architect's option, Testing Agency shall take one core from each trial section per Section 3.3.C to test for sealer effectiveness in accordance with ASTM C642. Such cores will then serve as "base cores" for which the remainder of sealer application will be tested. At Architect's direction, additional cores shall be taken randomly for testing comparison with the "base cores".

F. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

G. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the commencement of the Work.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.

2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
3. Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

H. Mockups: Build mockups incorporating products, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:

1. Joint sealants in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.
2. Joint sealants - Provide two 4' long mockups for each joint sealant and each substrate.
3. Deck coating systems - Provide two 4'x4' mockups for each deck coating system and each substrate.
4. Vertical membrane system – 100 sf for each type
5. Structural expansion joint system – 6 lf for each type, including transition details.
6. Expansion joint nosing material - Provide two mockups of size required for adhesion testing for each nosing material and each substrate.

I. Preconstruction Field-Adhesion and Slip Resistance Testing: Before installing elastomeric sealants, deck coating, and expansion joint nosing material, perform field tests as follows:

1. Locate field test mockup where indicated or, if not indicated, as directed by Architect.
2. Conduct field-adhesion tests for each application indicated below:

    a. Each type of elastomeric sealant indicated and the applicable joint substrates.
    b. Each type of nonelastomeric sealant indicated and the applicable joint substrates.
    c. Each type of deck coating indicated and the applicable substrates.
    d. Each type of expansion joint nosing material indicated and the applicable substrates.

3. Conduct field slip resistance tests for each application indicated below:

    a. Each type of deck coating indicated and the applicable substrates.

4. Notify Architect seven days in advance of dates and times when tests will be performed.
5. Arrange for tests to take place with product manufacturer's technical representative present.

6. Refer to Field Quality Control under Part 3 for additional requirements.

J. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 PERFORMANCE REQUIREMENTS

A. Provide products that establish and maintain watertight and airtight continuous waterproofing system without staining or deteriorating joint substrates.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Apply waterproofing systems within the range of ambient and substrate temperatures recommended in writing by manufacturer. Do not apply waterproofing systems to damp or wet substrates, when temperatures are below 40 deg F, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F above dew point.

B. Do not proceed with installation of waterproofing systems under the following conditions:

1. Do not apply waterproofing systems in snow, rain, fog, or mist, or when such weather conditions are imminent during the application and curing period. Apply only when frost-free conditions occur throughout the depth of substrate.
2. Contaminants capable of interfering with adhesion have not yet been removed from substrates.
3. Where conditions exist that do not meet the manufacturer's requirements for applications indicated.
4. Where conditions exist that can cause off gassing of the waterproofing systems.

C. Do not install waterproofing systems until items that penetrate the waterproofing have been installed.

1.8 WARRANTY

A. The system manufacturer and the approved applicator shall furnish a written performance joint warranty that, subject to certain specific exclusions as described in such joint warranty, the system provided will be free of defects related to workmanship or material deficiency. The following conditions shall be specifically covered under the joint warranty:

1. Cohesive or adhesive failure of materials.
2. Weathering deficiencies resulting in failure of the system to provide its intended function.
3. Abrasion or tear failure of the system resulting from normal traffic use. (Abrasive maintenance equipment, truck and construction traffic are not normal traffic use and related problems are exempted from the warranty.)
4. Joint Warranty Period: Refer to Section 1.8.C.1 below for joint warranty period requirements, with the exception of concrete sealer.

B. The system manufacturer and the approved applicator shall submit to the Owner for approval a detailed joint warranty statement consistent with the terms of this specification prior to construction. The approved joint warranty shall represent the sole warranty statement and warrant obligation for the project relating to this trade. Where an apparent conflict is found to exist with respect to the warranty language of this section and the detailed warranty statement, the more stringent warranty requirement shall supersede and control.

C. Special Manufacturer and Installer Joint Warranty: Manufacturer's standard form in which the Manufacturer and Installer jointly agree to furnish and repair or replace the product(s) that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Joint Warranty Period for all products listed in Part 2 of this Section, unless noted otherwise: Five years from date of Substantial Completion.

D. Special joint warranty specified in this article exclude deterioration or failure from the following:

1. Movement caused by structural settlement or errors attributable to design or construction resulting in stresses exceeding the manufacturer's written specifications for elongation and compression.
2. Disintegration from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide waterproofing systems including backings, and other related materials that are compatible with one another and with substrates under conditions of service and application, as demonstrated by the system manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

C. Protective Concrete Sealer System:

1. Acceptable concrete sealers are listed below. Application rates and solids content shall be in accordance with certified test results on the NCHRP 244 performance criteria.
2. Four Inch Cube Tests: 75% effective in reducing water absorption when compared to an untreated control sample.
3. Southern Exposure Tests: 90% effective in reducing chloride ion content when compared to an untreated control sample.

4. The following materials are approved for usage under this section:

   a. 100% Solids Content:

      1) "Iso-Flex 618 - 100 CRS", LymTal International Inc.
      2) "Protectosil BH-N 100", Evonik Industries.
      3) "MasterProtect H 1000 or H 1001", BASF Building Systems.
      4) "Planiseal WR 100", Mapei Corporation.
      5) "Baracade Silane 100", Euclid Chemical.
      6) "Sealmaster 100%", Kelmar Waterproofing Systems, Technical Barrier System, Inc.
      7) "Klere-Seal 9100-S", Pecora Corporation.
      8) "Sikagard 705L", Sika Corporation.

5. Apply Sealer to the following locations:

   a. Slab-on-grade and supported levels within the parking deck with the exception of areas that receive a coating or finish.
   b. Concrete approach drives within the construction limits.

D. Elastomeric Traffic Deck Coating:

1. Traffic deck coating systems specified herein shall be complete systems of compatible materials. Components of systems shall include a base membrane, a traffic topping and all sealants, primers, flashing, aggregates and miscellaneous materials as required by the manufacturer to complete the system.

2. Traffic deck coating systems shall meet the following slip resistance requirements:

   a. Coefficient of friction not less than 0.85 when tested under wet conditions.
   b. Variation in slip resistance test results not greater than +/- 0.10.
   c. Refer to Field Quality Control under Part 3 for additional requirements.

3. Aggregates: Aggregate type, size and gradation as recommended by system manufacturer and as needed to meet or exceed slip resistance requirements. Comply with ACI 503.3.

   a. Oven-dried, washed, angular shaped silica sand, flint, basalt or aluminum oxide aggregate applied in wear coats with minimum Mohs scale hardness as follows:

      1) Silica sand: 7 minimum
      2) Flint: 7 minimum
      3) Basalt: 7 minimum
      4) Aluminum oxide: 9 minimum

   b. Aluminum oxide powder applied in seal coat.

4. The following urethane deck coating systems are approved for usage under this section subject to compliance with requirements:

   a. Two-Component Urethane Systems:

1) "Autogard FC", Neogard, Division of Jones-Blair.
2) "Iso-Flex 750U", LymTal International Inc.
3) "MasterSeal Traffic 2500", BASF Building Systems.
4) "Mapefloor Parking Deck System – Mapefloor PU 400LV/Finish 415 NA/Finish 450", Mapei Corporation.
5) "Pecora-Deck 800 FC", Pecora Corporation.
6) "Qualideck Vehicular Traffic Bearing Membrane System", Advanced Polymer Technology Corporation.
7) "Sikalastic 720/745", Sika Corporation.
8) "Kelmar Merdek", Technical Barrier System, Inc.

b. Application rates for medium and heavy duty systems: rates are for bidding purposes and are to be confirmed in the field using a 100 sf mockup.

1) Primer: 0.33 gal. minimum per 100 sf (300 sq. ft. maximum per gal.)
2) Polyurethane base coat: 1.33 gal. minimum per 100 sf (75 sq. ft. maximum per gal.)
3) Polyurethane wear coat: 0.5 gal. minimum per 100 sf (200 sq. ft. maximum per gal.)
4) Broadcast aggregate into wear coat: 15 lbs. minimum per 100 sq. ft. to excess
5) 2nd Polyurethane wear coat (*for heavy duty systems*): 0.75 gal. minimum per 100 sf (133 sq. ft. maximum per gal.)
6) 2nd Broadcast aggregate into wear coat (*for heavy duty systems*): 15 lbs. minimum per 100 sq. ft. to excess
7) Polyurethane seal coat: 0.75 gal. minimum per 100 sf (133 sq. ft. maximum per gal.).

c. Where indicated, use medium-duty system for stalls and heavy-duty system for the drive and turning lanes. Where indicated, use heavy-duty system above occupied spaces and at speed ramps. Average coating thickness exclusive of aggregate:

1) Medium duty system: 46 dry mils
2) Heavy duty system: 58 dry mils

d. Use aromatic seal coat on lower tiers and 100% aliphatic seal coat on top tier.
e. Apply Urethane System to the following areas:

1) At areas over occupied spaces, conditioned spaces, rooms with equipment and as shown on the Drawings.

E. Vertical membrane system (anti-carbonation crack-bridging coating):

1. Vertical membrane systems specified herein shall be complete systems of compatible materials. Components of systems shall include a base membrane and all sealants, primers, flashing, aggregates and miscellaneous materials as required by the manufacturer to complete the system.
2. The following vertical membrane systems are approved for usage under this section:

a. Basis of Design: "Sikagard 550W Elastic" and "Sikagard 552W Primer", Sika Corporation.

b. "TammsCoat" and "Tamms HP Primer", Euclid Chemical.
c. Or Equal.

3. Application rates: rates are for bidding purposes and are to be confirmed in the field using a 100 sf mockup.

   a. Primer: 0.31 gal. minimum per 100 sf (320 sq. ft. maximum per gal.)
   b. Base Material: 16 mils minimum dry film thickness (applied in two coats of 8 mils minimum dry film thickness)

4. Apply vertical membrane system to the following areas:

   a. At areas shown on the Drawings.

F. Slab and Deck Control Joint Sealant System:

1. Sealants specified under this section shall be a complete system of compatible materials designed to produce waterproof, traffic-bearing control joint seals as detailed in the drawings. Primers, backer rods and related miscellaneous materials shall be used as recommended by the manufacturer.
2. All materials specified herein shall be unmodified polyurethanes containing no adulterants and shall meet the standards defined in federal specification ASTM C920, Type M or S, Class 25, self-leveling and non-sag sealants.
3. The following materials are approved for usage under this section:

   a. Sealant for Horizontal (Non-Cove) Joints:

      1) "Iso-Flex 880GB/881/830", LymTal International Inc.
      2) "Dynatred", Pecora Corporation.
      3) "MasterSeal SL 2", BASF Building Systems.
      4) "THC900/THC901" or "Vulkem 45 SSL", Tremco, Inc.
      5) "Sikaflex-2C SL", Sika Corporation.

   b. Sealant for Vertical and Cove joints:

      1) "Iso-Flex 881/830", LymTal International Inc.
      2) "Dymeric 240FC", Tremco, Inc.
      3) "Sikaflex-2C NS", Sika Corporation.
      4) "Dynatrol II", Pecora Corporation.
      5) "MasterSeal NP 2", BASF Building Systems.

4. Apply Sealant System to all joints as noted on Drawings

G. Structural Expansion Joint Sealing Systems:

1. The expansion joint sealing system shall be a complete system of compatible materials designed to produce waterproof, traffic bearing expansion joint seals as detailed on Drawings.

a. Nosing, traffic plates, blockout fillers, bond breakers, primers and miscellaneous materials required for installation shall be recommended by the system manufacturer.

2. Bolt-Down, Extruded Elastomeric Seal Expansion Joint System.

a. The following extruded elastomeric seal systems are used singularly or in combination as detailed on the drawings and are approved for usage under this section:

1) "Wabo Elastoflex Expansion Joint System", Watson Bowman Acme, BASF The Chemical Company.
2) "MM Elastolok Membrane System", MM Systems Corporation.
3) "Iso-Flex Dura-Block System", LymTal International, Inc.
4) "RB Series Heavy-Duty Rubber Block System", Balco, Inc.

b. Approved bolt-down extruded elastomeric expansion joint sealing systems shall meet the following requirements:

1) The expansion joint seal shall be heavy duty, shock absorbing steel reinforced anchor block capable of resisting heavy duty traffic. No exceptions to this requirement will be considered.
2) The exposed surface shall be non-metallic, slip/skid resistant and resistant to ultra-violet rays and chemicals.
3) Seal gland shall be heat weldable to ensure continuity of seal throughout.
4) The elastomeric seal shall be mechanically bolted down to the concrete surface beneath using epoxy anchors over a continuous, full width bedding compound creating watertight seal throughout.
5) Joint Seal Directional Changes - At all changes in direction provide seals with factory heat welded splices such as 90° corners, tees and crosses. The seal shall extend a minimum of 2'-0" in each direction from the factory splice. Only straight, butt splice connections shall be allowed on the jobsite following manufacturers written instructions. All factory and field fused connections shall incorporate bonding of the complete seal profile. This includes fusing of all internal and external web configurations.

c. Use bolt-down extruded expansion joint system strictly at joints within the garage superstructure at the top tier where the joints would be exposed to snow plows and as shown on the Drawings.

2.3 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and

otherwise contribute to producing optimum sealant performance, select from the following types:

1. Type C (closed-cell material with a surface skin).
2. Type O (open-cell material)

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 GENERAL

A. All work shall be installed in strict accordance with system manufacturer's recommendations employing trained installers utilizing proper tools and equipment and working under the direct supervision of a technically competent and experienced supervisor. An authorized technical representative shall attend a pre-installation conference, be present for the first day of installation and provide a minimum of three field inspection reports to the Architect during the duration of the installation.

B. All surfaces related to work under this section shall be inspected by the applicator prior to commencing work. Any conditions discovered which render the substrate unsuitable shall be reported and satisfactorily corrected prior to installation of the specified system.

C. Coordinate and verify that related work items meet the following requirements:

1. All surfaces shall be clean, dry and of sound substrate at time of application. Surfaces shall be provided free of voids, ridges and sharp projections.
2. Concrete surface finishes shall be subject to approval of the applicator.
3. Concrete surfaces shall be water cured or cured with a compatible curing compound as recommended by the manufacturer.
4. Concrete surfaces shall have cured for an acceptable period as recommended by the system manufacturer for the various components of the applicable system.

D. Environmental Conditions:

1. System application shall be at temperatures as recommended by the system manufacturer.
2. The deck surface shall be dry at time of application according to ASTM D4263, Standard Test Method for Indicating Moisture in Concrete.
3. Provide adequate ventilation in accordance with system manufacturer's recommendations during installation of the deck waterproofing system.

E. Protect all work areas from traffic until fully cured.

3.2 EXAMINATION

A. Examine joints indicated to receive waterproofing system, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting product performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PROTECTIVE CONCRETE SEALER SYSTEM

A. Clean surfaces to be treated in accordance with the system manufacturer's recommendations. Acceptable methods include sweeping, blowing, vacuuming, pressure washing, water blasting, acid etching, sand blasting, or shot blasting as required to remove all laitance and surface contaminants to insure proper penetration and/or adhesion of the sealer.

B. Seal all joints prior to general surface treatment.

C. Select and install a test section prior to general application to verify installation procedures, application rates, adhesion, penetration and condition of the finished surface.

D. Concrete sealer shall be applied in accordance with system manufacturer's recommendation at the same rates and solids contents as tested against the criteria established in NCHRP 244.

E. Materials shall be applied by pressure sprayer, spray bar or roller.

F. Application rate shall be 125 sq. ft. per gallon for a 40% silane sealer and 200 sq. ft. per gallon for a 100% silane sealer.

G. Unsatisfactory results rejected under Section 1.5.E shall be grounds for rejection of sealer and sealer application or sealer reapplication using an approved product shall be completed at no additional cost to the Owner.

H. Sealer shall not be applied until concrete has fully cured but no earlier than 14 days after concrete has been poured. Striping shall not be placed until full cure of concrete sealer (generally, 14 days @ 70 degrees or higher) or bituminous pavement (generally, 30 days @ 45 degrees or higher) has been obtained.

3.4 ELASTOMERIC TRAFFIC DECK COATING SYSTEM

A. All traffic deck coatings are to be applied to acceptable clean, dry, sound substrates. Clean surfaces to be treated in accordance with the system manufacturer's recommendations. Acceptable methods include sweeping, blowing, vacuuming, pressure washing, water blasting, acid etching, sand blasting, or shot blasting as required to remove all laitance and surface contaminants to insure proper adhesion of the deck coating.

B. Select and install a test area prior to general application to establish procedures, verify adhesion, slip resistance, and acceptable appearance.

C. Surface preparation shall produce a surface profile matching CSP 4, 5 or 6 per ICRI 03732, as required to meet the requirements of the selected deck coating. Sweep and vacuum roughened surface to remove debris followed by low-pressure water cleaning. Coordinate surface preparation with the surface preparation for the corrosion-inhibiting treatment and vapor drive coating, as applicable.

D. Notify Architect 7 days prior to completion of the surface preparation. Meet with the Architect and manufacturer's representative to review surface preparation, joint preparation, adhesion test results, and crack preparation, as applicable. All joint and crack preparation shall be included in the cost of the traffic deck coating system.

1. Seal all underlying control and construction joints.
2. Cracks grater than 1/16"

    a. All static cracks shall be routed (V-groove) and gravity fed with a polymer sealer. Fill cracks with oven-dried sand before applying the polymer sealer per the manufacturer's requirements. After application of the polymer sealer, broadcast dry silica sand to refusal evenly over the crack.
    b. All dynamic cracks shall be routed (U-groove) and receive bond breaker and sealant as detailed.

3. Detail all joints and cracks, including cracks less than 1/16", with liquid flashing a distance of 3" on each side of the joint/crack to yield a total thickness of 30 dry mils. All dynamic cracks and joints, cracks and joints 1" and wider, and all precast double tee joints shall receive reinforcing fabric embedded in the liquid flashing detail strip. The reinforcing fabric shall be compatible with the selected deck coating system and shall prevent the deck coating system from cracking due to thermal and dynamic movement of the crack or joint. However, the reinforced detail strip is not expected to prevent cracking of the deck coating system if there are structural deficiencies that causes excessive movement, such as broken double tee connections.

E. Other detailing work including sealing around drains, penetrations, curb, column and wall bases, etc., shall be accomplished in accordance with system manufacturer's recommendations prior to general application.

F. Provide a grid system marked on the deck surface to designate the area for which a container of material must be used evenly applied to obtain the desired average dry mil film thickness. A wet mil gauge shall also be used to randomly verify that mil thickness at application is consistent with system manufacturer's recommendations.

G. Broadcast clean, dry aggregate into wear coats and mix slip resistant powder into seal coat as needed to meet slip resistance requirements.

H. Application shall be by squeegee, roller and power sprayer.

I. Install the Elastomeric Traffic Deck Coatings in accordance with a "wear-rated" heavy and medium duty system per Section 2.2.D.

3.5 SLAB AND DECK CONTROL JOINT SEALANT SYSTEM

A. All sealants are to be applied to clean, dry, sound substrates. Follow system manufacturer's recommendations for cleaning and preparation of joints. Tooled control joints provided by the Goldblatt Groover #06-314-M7 shall be prepared by grinding with V- shaped wheel prior to sealing.

B. Select and install a test section prior to general application to verify adhesion and acceptable appearance.

C. Backer rods, bond breakers and primers shall be used in accordance with system manufacturer's recommendations.

D. Care shall be taken to completely fill joints without overflowing the joint or smearing adjacent surfaces.

E. Exposed joints shall be filled with sealant and tooled to a slightly recessed configuration to avoid direct contact with wheel traffic.

F. Sealant shall not be applied until after concrete curing procedures has been completed (normally at least 7 days after concrete has been poured).

3.6 STRUCTURAL EXPANSION JOINT SEALING SYSTEM

A. General:

1. Submit product data of expansion joint system to be used.
2. Coordinate expansion joint system with other related work before installation of such work.
3. Provide 6-inch vertical return upwards at column or wall termination as applicable.

B. Installation of the Bolt-Down Elastomeric Expansion Joint System.

1. Provide blockouts in the concrete surface, of sufficient width and depth to receive the specified system, to be formed at the expansion joint by the concrete contractor.

2. Install the anchor bolts at proper spacing and set the gap dimension according to the manufacturer's recommended installation temperature. Seal all gaps including boltholes using heat weldable sealing gland.
3. Fill concrete blockouts with approved polymeric nosing material flush to the top of the metal edge anchor strips and the driving surface.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform the field tests and inspections.

B. Joint Sealant Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test mockups and completed elastomeric sealant joints as follows:

   a. Perform 2 tests for each mockup.
   b. Perform 10 tests for the first 1000 feet of joint length for each type of elastomeric sealant and joint substrate.
   c. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor.

2. Test Method: ASTM C 1193, Appendix X1.1.

   a. As appropriate for type of joint-sealant application indicated, test joint sealants according to one of the following:

      1) Method A, Field-Applied Sealant Joint Hand Pull Tab
      2) Method B, Exposed Surface Finish Hand Pull Tab
      3) Method C, Field-Applied Sealant Joint Hand Pull Flap
      4) Method D, Water Immersion.

   b. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.
4. Inspect tested joints and report on the following:

   a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
   b. Whether sealants filled joint cavities and are free of voids.
   c. Whether sealant dimensions and configurations comply with specified requirements.

5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints

were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.

6. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

C. Deck Coating Field-Adhesion Testing: Field test deck coating adhesion to substrates as follows:

1. Extent of Testing: Test mockups and completed deck coatings as follows:

   a. Perform 2 tests for each mockup.
   b. Perform 6 tests for the first 10,000 square feet of deck coating for each type of deck coating and substrate.
   c. Perform 1 test for each 10,000 square feet of deck coating thereafter, but not less than 1 test per floor.

2. Test Method: ASTM D7234.

3. Inspect deck coating for bubbles, voids, aggregate distribution, and for application complying with specified requirements. Record results in a field-adhesion-test log.

4. Inspect deck coating preparation, installation, and testing. Record results in a log and report on the following:

   a. Dates when surface preparation was performed.
   b. Type of surface preparation.
   c. If surface contaminants such as engine oil were present on the slab prior to surface preparation and cleaning.
   d. If surface contaminants remain on the slab after surface preparation and cleaning.
   e. Relative humidity of the slabs prior to application of deck coatings.
   f. Time, date, temperature, precipitation, relative humidity, and sun exposure when deck coatings were installed. Note if conditions changed during the installation.
   g. Type of materials used for deck coating installation and wait times between each application.
   h. Deck coating dry mil thickness and if the thickness complies with specified requirements.
   i. Test dates, test locations, and adhesion results (whether deck coating failed to adhere to substrates or tore cohesively).
   j. Names of persons who performed surface preparation, who performed relative humidity testing, who installed deck coatings, and who performed adhesion tests.

5. Repair deck coatings pulled from test area by applying new deck coating following same procedures used originally. Ensure that original surfaces are clean and that new deck coating overlaps original deck coating.

D. Deck Coating Field Slip Resistance Testing: Field test deck coating slip resistance as follows:

1. Extent of Testing: Test mockups and completed deck coatings as follows:

   a. Perform 2 tests for each mockup.

b. Perform 6 tests for the first 10,000 square feet of deck coating for each type of deck coating.
c. Perform 1 test for each 10,000 square feet of deck coating thereafter, but not less than 1 test per floor.

2. Test Method:

a. ANSI/NFSI B101.1 - Test Method for Measuring Wet Static Coefficient of Friction (SCOF) of Common Hard-Surface Floor Materials

3. Inspect deck coating for variations in aggregate distribution. Locate tests at areas with high density of aggregate and with low density of aggregate. Record results in a log and report on the following:

a. Test method, test dates, test locations, and slip resistance results.
b. Names of person who performed tests.
c. Type of deck coating and aggregate.
d. Application rates of deck coating system components.
e. Approximate area (square feet) of deck coating that exhibits a low density of aggregate, an average density of aggregate, and a high density of aggregate.

4. Repair deck coating test area, if damaged during testing, by applying new deck coating following same procedures used originally. Ensure that original surfaces are clean and that new deck coating overlaps original deck coating.

E. Expansion Joint Nosing Material Field-Adhesion Testing: Field test nosing material adhesion to substrates as follows:

1. Extent of Testing: Test mockups as follows:

a. Perform 2 tests for each mockup.

2. Test Method: ASTM D7234.

3. Inspect nosing material preparation, installation, and testing. Record results in a log and report on the following:

a. Dates when surface preparation was performed.
b. Type of surface preparation.
c. If surface contaminants such as engine oil were present on the slab prior to surface preparation and cleaning.
d. If surface contaminants remain on the slab after surface preparation and cleaning.
e. Relative humidity of the slabs prior to application of nosing material.
f. Time, date, temperature, precipitation, relative humidity, and sun exposure when expansion joints were installed. Note if conditions changed during the installation.
g. Type of materials used for nosing material installation and wait times between each application.
h. Test dates, test locations, and adhesion results (whether nosing material failed to adhere to substrates or tore cohesively).
i. Names of persons who performed surface preparation, who performed relative humidity testing, who installed nosing material, and who performed adhesion tests.

4. Remove nosing material mockup after testing and prepare the substrate for installation of the expansion joint. Repair the substrate if necessary.

F. Evaluation of Field Test Results: Products not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove products that fail to adhere to substrates during testing or to comply with other requirements. Reapply mockups and retest until test results prove products comply with indicated requirements. Do not use products that fail to adhere to substrates during testing.

3.8 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.9 PROTECTION

A. Protect waterproofing systems during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so systems are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated products immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079020

SECTION 321723 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes painted markings applied to concrete pavement including the following:

1. Parking Striping
2. Traffic Arrows.
3. Accessibility International Symbol.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include technical data and tested physical and performance properties.

B. Shop Drawings: For pavement markings.

1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

1.4 QUALITY ASSURANCE

A. Verify compatibility of paint with all sealers, sealants, traffic coatings and all other materials of the surface to be painted.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for alkyd materials or 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Aexcel Inc.
2. Benjamin Moore & Co.
3. Color Wheel Paints & Coatings.
4. Columbia Paint & Coatings.
5. Conco Paints.
6. Coronado Paint; Division of INSL-X Products Corporation.
7. Diamond Vogel Paints.
8. Dunn-Edwards Corporation.
9. Ennis Traffic Safety Solutions, Inc.
10. Frazee Paint.
11. General Paint.
12. Kwal Paint.
13. M.A.B. Paints.
14. McCormick Paints.
15. Miller Paint.
16. Parker Paint Mfg. Co. Inc.
17. PPG Industries.
18. Pratt & Lambert.
19. Rodda Paint Co.
20. Rohm and Haas Company; a subsidiary of The Dow Chemical Company.
21. Scott Paint Company.
22. Sherwin-Williams Company (The).

2.2 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" the ABA standards of the Federal agency having jurisdiction and ICC A117.1.

2.3 PAVEMENT-MARKING PAINT

A. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, Type N Type F or Type S; colors complying with FS TT-P-1952.

1. Color: White Yellow or Blue.

B. Pavement-Marking Paint: MPI #32, solvent-borne traffic-marking paint.

1. Color: White Yellow or Blue.

C. Glass Beads: AASHTO M 247, Type 1 made of 100 percent recycled glass.

1. Roundness: Minimum 80 percent true spheres by weight.

D. VOC Content: Pavement markings used on building interior shall have a VOC content of 150 g/L or less.

E. Accessibility International Symbol character shall follow proportions as specified in ANSI A117.1-1986.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.

B. Coordination of Work: Review other Sections in which surface treatments are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

1. Notify the Architect of anticipated problems using the materials specified over substrates.

3.2 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for a minimum of 30 days before starting pavement marking.

C. Pavement marking paint shall not be placed until full cure of concrete sealer (generally, 14 days @ 70 degrees or higher) or bituminous pavement (generally, 30 days @ 45 degrees or higher) has been obtained.

D. Clean and prepare surfaces as required to remove all existing paint, surface treatment residue, oil, grease, laitance and other surface contaminants that could impair bond of paints. Pavement-marking paint shall be applied to clean, dry, sound substrates that are in accordance with the paint manufacturer's written installation requirements.

1. Acceptable cleaning and surface preparation methods includesweeping, blowing, vacuuming, pressure washing, water blasting, acid etching, sand blasting, shot blasting, and use of pavement cleaners.

a. Pavement Cleaners: Chemical cleaners acceptable to manufacturers of pavement-marking paint, free of oily residues or other substances capable of staining or harming pavement substrates in any way, or preventing adhesion.

2. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

E. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.
2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal.

F. Lay out all striping in accordance with the dimensions and details shown on the Drawings. Before starting, notify Architect of any discrepancies or interferences for actual field conditions. Contractor shall be responsible for removing paint and repainting any incorrect markings that would have been corrected by such notification.

3.3 FIELD QUALITY CONTROL

A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when pavement marking paint is being applied:

1. The Owner will engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.
2. The testing agency will perform appropriate tests for the following characteristics as required by the Owner:

    a. Quantitative materials analysis.
    b. Apparent reflectivity.
    c. Washability.
    d. Accelerated weathering.
    e. Dry opacity.
    f. Color retention.

3. If test results show material being used does not comply with specified requirements, the Contractor may be directed to stop painting, remove noncomplying paint, pay for testing, repaint surfaces coated with rejected paint, and remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are incompatible.

3.4 PROTECTING AND CLEANING

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

B. Protect pavement markings from damage and wear during remainder of construction period.

C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

D. Provide "Wet Paint" signs to protect newly painted finishes.

END OF SECTION 321723

Insurance Requirement Sheet

Insurance Requirements: Before starting and until final completion and acceptance of the work called for in the Contract and expiration of the guarantee period provided for in the Contract, the Contractor and its subcontractors, if any, shall procure and maintain insurance of the types and amounts checked in paragraphs A through F below for all Contract operations.

☒ **A. General Liability, with minimum coverages for combined bodily injury and property damage liability of $2,000,000 general aggregate, $1,000,000 per occurrence including:**

- ☒ **1. Commercial General Liability.**
- ☒ **2. Town as additional insured. Contractor's insurance must be primary and non-contributory.**
- ☐ **3. Owners and Contractors Protective Liability (separate policy in the name of the Town).**

☒ **B. Comprehensive Automobile Liability, with minimum coverages of $1,000,000 combined single limit for bodily injury and property damage, including, where applicable, coverage for any vehicle, all owned vehicles, scheduled vehicles, hired vehicles, non-owned vehicles and garage liability.**

☒ **C. Excess Liability, with minimum coverage of $5,000,000 in umbrella form, or such other form as approved by Town Department Head and Risk Management Director.**

☒ **D. Workers' Compensation and Employer's Liability, with minimum coverages as provided by Connecticut State Statutes.**

☐ **E. Professional Liability (for design and other professionals for Errors and Omissions), with minimum coverage of $1,000,000. If the policy is on a claims-made basis, coverage shall be continually renewed or extended for three (3) years after work is completed under the Contract.**

☐ **F. Other (Builder's Risk, etc.):_____.**

☒ **G. CERTIFICATE HOLDER: TOWN OF GREENWICH**
ATTN: PURCHASING DEPT. (Also fill in on ACORD Certificate of Insurance)
101 Field Point Road, Greenwich, CT 06830.

The **Acord certificate of insurance form** must be executed by your insurance agent/broker and returned to this office. The most current Acord form should be used for insurance documentation purposes. Company name and address must conform on all documents including insurance documentation. It is required that the agent/broker note the individual insurance companies providing coverage, rather than the insurance group, on the Acord form. The Contract number (provided to the awarded Contractor), project name and a brief description must be inserted in the "Description of Operations" field. It must be confirmed on the Acord Form that the Town of Greenwich is endorsed as an additional insured by having the appropriate box checked off and stating such in the "Description of Operations" field. **A letter from the awarded vendor's agent/broker certifying that the Town of Greenwich has been endorsed onto the general liability policy as an additional insured is also mandatory.** This letter **must follow exactly the format provided by the Purchasing Department and must be signed by the same individual authorized representative who signed the Acord form.** If the insurance coverage required is provided on more than one Acord certificate of insurance, then additional agent/broker letters are also required. Contract development will begin upon receipt of complete, correct insurance documentation.

The Contractor shall be responsible for maintaining the above insurance coverages in force to secure all of the Contractor's obligations under the Contract with an insurance company or companies with an AM Best Rating of A:VII or better, licensed to write such insurance in Connecticut and acceptable to the Risk Manager, Town of Greenwich. For excess liability only, non-admitted insurers are acceptable, provided they are permitted to do business through Connecticut excess line brokers per listing on the current list of Licensed Insurance Companies, Approved Reinsurers, Surplus Lines Insurers and Risk Retention Groups issued by the State of Connecticut Insurance Department.

AGENT/BROKER
(LETTERHEAD)

(Date)

Town of Greenwich
Director of Purchasing
101 Field Point Road
Greenwich, CT 06830

Re: **(Name of the Insured)**
Town of Greenwich Contract No. **XXXX**

Dear Director of Purchasing:

The undersigned hereby certifies as follows:

(1) I am a duly licensed insurance agent under the laws of the State of **[insert state]** and an authorized representative of all companies affording coverage under the Acord form submitted herewith;

(2) The Town of Greenwich has been endorsed as an additional insured under general liability policy no. **[insert policy number]**, issued by **[insert company affording coverage]** to **[name of insured]**;

(3) The general liability policy referenced in paragraph (2) above meets or exceeds the coverage in Commercial General Liability ISO form CG 00 01 10 01, including contractual liability;

(4) The policies listed in the Acord form submitted to the Town of Greenwich in connection with the above referenced contract have been issued to the insured in the amounts stated and for the periods indicated in the Acord form; and

(5) The Town of Greenwich shall be given thirty (30) days prior written notice of cancellation, lapse or restrictive amendment (except ten days notice of nonpayment) of the policies listed in the Acord form.

Sincerely,

(Signature)

Type Name
Authorized Representative for all companies listed in the Acord form

AGREEMENT

CONTRACT NO.

THIS AGREEMENT, executed this day of in the year Two Thousand Nineteen (herein referred to as the "AGREEMENT"), by and between the Town of Greenwich, Connecticut, acting through _____ hereunto duly authorized, "OWNER" and _____, acting through _____ (insert name of individual and title) duly authorized, "CONTRACTOR".

WITNESSETH, that the parties to these presents, each in consideration of the under-taking, promises and agreements on the part of the other herein contained, have undertaken, promised and agreed to do hereby undertake, promise and agree, the Owner for itself, its successors and assigns, and the Contractor for himself and his heirs, executors, administrators, successors and assigns, as follows:

1. DEFINITIONS:

Wherever the words hereinafter defined or pronouns used in their stead occur in the Contract Documents, they shall have the following meaning:

The word "Owner" shall mean the Town of Greenwich and shall include its authorized representative.

The word "Contractor" shall mean the person or organization identified as such in this Agreement and shall include his authorized representative.

The words "Contracting Officer or Agency" shall mean that official of the Town which awards the contract, executes the Agreement and is the Owner's authorized representative.

The Information for Bidders, the Contractor's Bid as accepted by the Owner, the Contract Conditions and Specifications and the General, Technical and Materials Specifications, the Drawings, and all addenda and amendments to any of the foregoing, collectively constitute the Contract Documents, and are sometimes herein referred to as the "Contract".

2. DESCRIPTION OF WORK AND CONTRACT TERM:

3. PAYMENT:

The Contractor shall be paid on a monthly basis after presentation of vouchers, and subject to acceptance and approval by the Town of Greenwich.

Such payments will be made by the Town of Greenwich monthly for all services actually rendered, and the acceptance by the Contractor of any such monthly payment shall be a release to the Town of all claims and all liability to the Contractor in connection with the contract, arising during the period for which payment is made. No payment, however, shall operate to release the Contractor or its sureties or insurers from any obligation under the Contract to be entered into or the Performance Bond or any insurance policies issued in connection with said contract.

4. PERFORMANCE MAINTENANCE AND PAYMENT BOND:

The Contractor shall, simultaneously with the signing of the Contract, furnish the Town the executed Performance, Maintenance and Payment Bond of a surety company authorized to do business in the State of Connecticut, and acceptable to the Town, in the sum of the full amount of the Contract obligation in the form provided by the Town.

THE ABOVE IS ONLY REQUIRED FOR CONTRACTS EXCEEDING $100,000.00.

For contracts that require a Performance, Maintenance and Payment Bond, the Contractor shall maintain all of the specified required insurance coverage and continue to document the specified required insurance coverage for one (1) year after completion of the work of the contract (or other such time as the contract or other agreement requires).

5. GUARANTEE:

The Contractor guarantees that the Work and services to be performed, furnished, used or installed in the construction of the same, shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the Drawings, if any, Specifications, and other Contract Documents, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirements of the Contract shall be fulfilled. This guarantee shall be for a period of one year from and after the date of completion and acceptance of the Work as stated in the final estimate. The Contractor shall repair, correct or replace as required, promptly and without charge, all work, equipment and material, or parts thereof, which fail to meet the above guarantee or which in any way fail to comply with or fail to be in strict accordance with the terms and provisions and requirements of the Contract during such one-year period, and also shall repair, correct, or replace all damage to the Work resulting from such failure.

6. DEFECTIVE WORK:

The inspection of the Work shall not relieve the Contractor of any of his obligations to perform and complete the Work as required by the Contract. Defective work shall be corrected and unsuitable materials, equipment apparatus and other items shall be replaced by the Contractor, notwithstanding that such work, materials, equipment, apparatus and other items mayhave been previously overlooked or accepted or estimated for payment. If the work or any part thereof shall be found defective at any time before the final acceptance of the work, the

Contractor shall forthwith make good such defect in a manner satisfactory to the Town; if any material, equipment, apparatus or other items brought upon the site for use or incorporation in the work, or selected for the same, is condemned by the Town as unsuitable or not in conformity with the Specifications or any of the other Contract Documents, the Contractor shall forthwith remove such materials, equipment, apparatus and other items from the site of the Work and shall at his own cost and expense make good and replace the same and any material furnished by the Town which shall be damaged or rendered defective by the handling or improper installation by the Contractor, his agents, servants, employees or subcontractors.

7. COMPLIANCE WITH LAWS:

The Contractor shall keep himself fully informed of all existing and future federal, state and local laws, ordinances, rules and regulations affecting those engaged or employed on the work, the materials and equipment used in the work or the conduct of the work, and of all orders, decrees and other requirements of bodies or tribunals having any jurisdiction or authority over the same. If any discrepancy or inconsistency is discovered in the Drawings, if any, Specifications or other Contract Documents in relation to any such law, ordinance, rule, regulation, order, decree or other requirement, the Contractor shall forthwith report the same to the Town in writing. The Contractor shall at all times observe and comply with, and cause all his agents, servants, employees and subcontractors to observe and comply with all such existing and future laws, ordinances, rules, regulations, orders, decrees and other requirements, and he shall protect, indemnify and save harmless the Town, its officers, agents, servants and employees from and against any and all claims, demands, suits proceedings, liabilities, judgments, penalties, losses, damages costs and expenses, including attorneys' fees, arising from or based upon any violation or claimed violation of any such law, ordinance, rule, regulation, order, decree or other requirement, whether committed by the Contractor or any of his agents, servants, employees or subcontractors.

8. INDEMNITY:

The Contractor shall indemnify and save harmless the Town and its officers, agents, servants and employees, from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees, on account of bodily injury, sickness, disease or death sustained by any person or persons or injury or damage to or destruction of any property, directly or indirectly arising out of, relating to or in connection with the Work, whether or not due or claimed to be due in whole or in part to the active, passive or concurrent negligence or fault of the Contractor, his officers, agents, servants or employees, any of his subcontractors, the Town any of his respective officers, agents, servants or employees and/or any other person or persons, and whether or not such claims, demands, suits or proceedings are just, unjust, groundless, false or fraudulent; and the Contractor shall and does hereby assume and agrees to pay for the defense of all such claims, demands, suits and proceedings; and provided that the Contractor shall not be required to indemnify the Town, its officers, agents, servants or employees against any such damages occasioned solely by acts or omissions of the Town other than supervisory acts or omissions of the Town in connection with the Work.

INDEMNITY AGAINST SUBCONTRACTORS' CLAIMS:

If any other contractor or any subcontractor of any such other contractor shall suffer or claim to have suffered loss, damage or delay by reason of the acts or omissions of the Contractor or of any of his subcontractors, the Contractor agrees to assume the defense against any such claim and to reimburse such other contractor or subcontractor for such loss or damage. The Contractor agrees to and does hereby indemnify and save harmless the Town from and against any and all claims by such other contractors or subcontractors, alleging such loss, damage or delay and from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses including attorneys' fees, arising out of, relating to or resulting from such claims.

9. PATENTS:

The Contractor shall indemnify and save harmless the Town and all persons acting for or on behalf of the Town from all claims and liability of any nature or kind, and all damages, costs and expenses, including attorneys' fees, arising from or occasioned by an infringement or alleged infringement of any patents or patent rights on any invention, process, materials, equipment, article, or apparatus, or any part hereof, furnished and installed by the Contractor, or arising from or occasioned by the use or manufacture thereof, including their use by the Town.

10. CHANGES:

The Town, through its designated Agent, may make changes in the Work and in the Drawings, if any, and Specifications therefor by making alterations therein, additions, thereto or omissions therefrom. All work resulting from such changes shall be performed and furnished under and pursuant to the terms and conditions of the Contract. If such changes result in an increase or decrease in the Work to be done hereunder, or increase or decrease the quantities thereof, adjustment in compensation shall be made therefor. For eliminated or decreased work the Contractor shall allow the Town a reasonable credit as determined by the Parties. Except in an emergency endangering life or property, no change shall be made unless in pursuance of a written order from the Town authorizing the change, and no claim for additional compensation shall be valid unless the change is so ordered.

The Contractor agrees that he shall neither have nor assert any claim for or be entitled to any additional compensation for damages or for loss of anticipated profits on work that is eliminated.

11. CLAIMS FOR DAMAGES:

If the Contractor makes claim for any damages alleged to have been sustained by breach of contract or otherwise, he shall, within ten (10) days after occurrence of the alleged breach or within ten (10) days after such damages are alleged to have been sustained whichever date is the earlier, file with the Contracting Officer a written, itemized statement of the details of the alleged breach and the details and amount of the alleged damages. The Contractor agrees that unless such

statement is made and filed as so required, his claim for damages shall be deemed waived, invalid and unenforceable, and that he shall not be entitled to any compensation for any such alleged damages. Within ten (10) days after the timely filing of such statement, the Contracting Officer shall file with the appropriate department of the Town, one copy of the statement, and shall file with the Town and the Contractor his determination thereon. The Contractor shall not be entitled to claim any additional compensation for damages by reason of any direction, instruction, determination or decision of the Town or its agents, nor shall any such claims be considered, unless the Contractor shall have complied in all respects with the provisions of this paragraph.

12. ABANDONMENT OF THE WORK OR OTHER DEFAULT:

If the Work shall be abandoned, or any part thereof shall be sublet without previous written consent of the Town, or the Contract or any moneys payable hereunder shall be assigned otherwise than as herein specified, or if at any time the Contracting Officer shall be of the opinion, and shall so certify in writing, that the conditions herein specified as to rate of progress are not being complied with, or that the Work or any part thereof is being unnecessarily or unreasonably delayed, or that the Contractor has violated or is in default under any of the provisions of the Contract, or if the Contractor becomes bankrupt or insolvent or goes or is put into liquidation or dissolution, either voluntarily or involuntarily, or petitions for an arrangement or reorganization under the Bankruptcy Act, or makes a general assignment for the benefit of creditors or otherwise acknowledges insolvency, the happening of any of which shall be and constitute a default under the Contract, the Town may notify the Contractor in writing, with a copy of such notice mailed to the surety, to discontinue all Work or any part thereof; thereupon the Contractor shall discontinue such Work or such part thereof as the Town may designate; and the Town may, upon giving such notice, by Contract or otherwise as it may determine, complete the Work or such part thereof and charge the entire cost and expense of so completing the work. The Town shall be entitled to reimbursement from the Contractor and the Contractor agrees to pay to the Town any losses, damages, costs and expenses, including attorneys' fees, sustained or incurred by the Town by reason of any of the foregoing causes. For the purpose of such completion the Town may for itself or for any Contractors employed by the Town take possession of and use or cause to be used any and all materials, equipment, plant, machinery, appliances, tools, supplies and such other items of every description that may be found or located at the site of the Work.

All costs, expenses, losses, damages, attorneys' fees, and any and all other charges incurred by the Town under this subsection shall be charged against the Contractor and deducted and/or paid by the Town out of any moneys due and payable or to become due or payable under the Contract to the Contractor; in computing the amounts chargeable to the Contractor, the Town shall not be held to a basis of the lowest prices for which the completion of the Work or any part thereof might have been accomplished, but all sums actually paid or obligated therefor to effect its prompt completion shall be charged to and against the account of the Contractor. In case the costs, expenses, losses, damages, attorneys' fees and other charges together with all payments theretofore made to or for the account of the Contractor are less than the sum which would have been payable under the Contract if the Work had been properly performed and completed by the

Contractor, the Contractor shall be entitled to receive the difference, and, and in case such costs, expenses, losses, damages, attorneys' fees and other charges, together with all payments theretofore made to or for the account of the Contractor, shall exceed the said sum, the Contractor shall pay the amount of the excess to the Town.

13. LIENS:

If at any time any notices of lien or other legal process are filed for labor performed or materials or equipment manufactured, furnished, or delivered to or for the Work, the Contractor shall, at its own cost and expense, promptly discharge, remove or otherwise dispose of the same, and until such discharge, removal or disposition, the Town shall have the right to retain from any moneys payable hereunder an amount which, in its sole judgment, it deems necessary to satisfy such liens and pay the costs and expenses, including attorneys' fees, of defending any actions brought to enforce the same, or incurred in connection therewith or by reason thereof.

14. CLAIMS:

If at any time there be any evidence of any claims for which the Contractor is or may be liable or responsible hereunder, the Contractor shall promptly settle or otherwise dispose of the same, and until such claims are settled or disposed of, the Town may retain from any moneys which would otherwise be payable hereunder so much thereof as, in its sole judgment, it may deem necessary to settle or otherwise dispose of such claims and to pay the costs and expenses, including attorneys' fees, of defending any actions brought to enforce such claims or incurred in connection therewith or by reason thereof.

15. LIABILITY OF TOWN:

No person, firm or corporation, other than the Contractor, who signed this Contract as such, shall have any interest herein or rights hereunder. No claim shall be made or be valid either against the Town or any agent of the Town and neither the Town nor any agent of the Town shall be liable for or be held to pay any money, except as herein provided. The acceptance by the Contractor of the payment as fixed in the final estimate shall operate as and shall be a full and complete release of the Town and of every agent of the Town of and from any and all claims, demands, damages and liabilities of, by or to the Contractor for anything done or furnished for or arising out of or relating to or by reason of the Work or for or on account of any act or neglect of the Town or of any agent of the Town or of any other person, arising out of, relating to or by reason of the Work, except the claim against the Town for the unpaid balance, if any there be, of the amounts retained as herein provided.

16. PROVISIONS REQUIRED BY LAW DEEMED INSERTED:

Each and every provision of law and clause required by law to be inserted in the Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though they were included herein. If through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion.

17. PERMITS:

The Contractor shall, at his own expense, take out and maintain all necessary permits from the State, Town, or other public authorities; shall give all notices required by law; and shall post all bonds and pay all fees and charges incident to the due and lawful prosecution of the Work.

18. NOT TO SUBLET OR ASSIGN:

The Contractor shall constantly give his personal attention to the faithful prosecution of the Work, shall keep the same under his personal control, shall not assign the Contract or sublet the Work or any part thereof without the previous written consent of the Town, and shall not assign any of the moneys payable under the Contract, or his claim thereto, unless by and with the like written consent of the Town and the surety on the Contract Bonds. Any assignment or subletting in violation hereof shall be void and unenforceable.

19. EMPLOY COMPETENT PEOPLE:

The Contractor shall employ only competent people on the Work and shall not employ people or means which may cause strikes, work stoppages and/or disturbances by workmen employed by the Contractor, any subcontractor, the Town, the Contracting Officer or any other contractor. Whenever the Contracting Officer notifies the Contractor in writing that in his opinion any person on the Work is incompetent, unfaithful, disorderly, or otherwise unsatisfactory or not employed in accordance with the provisions of the Contract, such person shall be discharged from the Work and shall not again be employed on it, except with the written consent of the Contracting Officer.

20. EMPLOY SUFFICIENT LABOR AND EQUIPMENT:

If in the sole judgment of the Contracting Officer the Contractor is not employing sufficient labor, plant, equipment or other means to complete the Work within the time specified, the Contracting Officer may, after giving written notice, require the Contractor to employ such additional labor, plant, equipment and other means as the Contracting Officer deems necessary to enable the Work to progress properly.

21. INTOXICATING LIQUORS:

The Contractor shall not sell and shall neither permit nor suffer the introduction or use of intoxicating liquors upon or about the Work.

22. ACCESS TO WORK:

The Town, the Contracting Officer, and their officers, agents, servants and employees may at any and all times and for any and all purposes, enter upon the Work and the site thereof and the premises used by the Contractor, and the Contractor shall at all times provide safe and proper facilities therefor.

23. EXAMINATION OF WORK:

The Contracting Officer shall be furnished by the Contractor with every reason able facility for examining and inspecting the Work and for ascertaining that the Work is being performed in accordance with the requirements and intent of the Contract, even to the extent of requiring the uncovering or taking down portions of finished work by the Contractor.

24. EXTRA WORK:

The Contractor shall perform any extra work (work in connection with the Contract but not provided for herein) when and as ordered in writing by the Contracting Officer, at the unit prices stipulated in the Contract for such work or, if none are so stipulated, either (a) at the price agreed upon before such work is commenced and named in the written order for such work, or (b) if the Contracting Officer so elects, for the reasonable cost of such work, as determined by the Contractor and approved by the Contracting Officer, plus a percentage of such cost, as may be agreed upon by Contract and Contracting Officer.

25. CHANGES NOT TO AFFECT BONDS:

It is distinctly agreed and understood that any changes made in the work or the Drawings or Specifications therefor (whether such changes increase or decrease the amount thereof or the time required for its performance) or any changes in the manner or time of payments made by the Town to the Contractor, or any other modifications of the Contract, shall in no way annul, release, diminish or affect the liability of the surety on the Contract Bonds given by the Contractor, it being the intent hereof that notwithstanding such changes the liability of the surety on said bonds continue and remain in full force and effect.

26. PRICES FOR WORK:

The Town shall pay and the Contractor shall receive the prices stipulated in the Bid made a part hereof as full compensation for everything performed and furnished and for all risks and obligations undertaken by the Contractor under and as required by the Contract.

27. MONEYS MAY BE RETAINED:

The Town may at any time retain from any moneys which would otherwise be payable hereunder so much thereof as the Town may deem necessary to complete the Work hereunder and to reimburse it for all costs, expenses, losses, damage and damages chargeable to the Contractor hereunder.

28. USE OR PARTIAL PAYMENT NOT ACCEPTANCE:

It is agreed that this is an entire contract for one whole and complete Work or result and that neither the Town's entrance upon or use of the Work or any part thereof nor any partial payments by the Town shall constitute an acceptance of the Work or any part thereof before its entire completion and final acceptance.

29. NON-CONNECTICUT CONTRACTORS:

Pursuant to Connecticut General Statutes §12-430(7), as amended by Connecticut Public Act #11-61, Section 66, a nonresident contractor shall comply with the State of Connecticut's bonding requirements.

30. PAYMENT TO SUBCONTRACTORS:

As required by Section 49-41a of the Connecticut General Statutes, within thirty days after payment to the Contractor by the Town for work under this Contract, he shall pay any amounts due any subcontractor, whether for labor performed or materials furnished when such labor or materials has been included in a requisition submitted by such Contractor and paid by the Town.

31. INSURANCE:

Insurance coverage required as noted in "Exhibit A" attached.

32. NON-DISCRIMINATION AND AFFIRMATIVE ACTION

(A)(1) The Contractor agrees and warrants that in the performance of the Contract such Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, sexual orientation, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such Contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or of the state of Connecticut. The Contractor further agrees to take affirmative action to insure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such Contractor that such disability prevents performance of the work involved; (2) the Contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, to state that it is an "affirmative action-equal opportunity employer" in accordance with regulations adopted by the commission; (3) the Contractor agrees to provide each labor union or representative of workers with which such Contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such Contractor has a contract or understanding, a notice to be provided by the commission advising the labor union or workers' representative of the Contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment; (4) the Contractor agrees to comply with each provision of this section and sections 46a-68e and 46a-68f and with

each regulation or relevant order issued by said commission pursuant to sections 46a-56, 46a-68e,46a-68f and 46a-86; (5) the Contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor as relate to the provisions of this section and section 46a-56.

(B) Any Contractor who is a party to a municipal public works contract or quasi-public agency project, where any such contract is valued at less than $50,000 for each year of the contract, shall provide the Commission on Human Rights and Opportunities with a written or electronic representation that complies with the nondiscrimination agreement and warranty under subsection (A)(1) above, provided if there is any change in such representation, the Contractor shall provide the updated representation to the Commission not later than 30 days after such change. Any Contractor who is a party to a municipal public works contract or a quasi-public agency project, where any such contract is valued at $50,000 or more for any year of the contract, shall provide the Commission with any one of the following: (1) Documentation in the form of a company or corporate police adopted by resolution of the board of directors, shareholder, managers, members or other governing body of such Contractor that complies with the nondiscrimination agreement and warranty under subsection (A)(1) of this section; (2) Documentation in the form of a company or corporate policy adopted by a prior resolution of the board of directors, shareholders, managers, members or other governing body of such contractor if (a) the prior resolution is certified by a duly authorized corporate officer of such contractor to be in effect on the date the documentation is submitted, and the executive director of the Commission on Human Rights and Opportunities or designee certifies that the prior resolution complies with the nondiscrimination agreement and warranty under subdivision (A)(1) of this section; or (3) Documentation in the form of an affidavit signed under penalty of false statement by a chief executive officer, president, chairperson or other corporate officer duly authorized to adopt company or corporate policy that certifies that the company or corporate policy of the contractor complies with the nondiscrimination agreement and warranty under subdivision (A)(1) of this section and is in effect on the date the affidavit is signed..

(C) If the Contract is a municipal public works contract or a quasi-public agency project, the Contractor agrees and warrants that s/he will make good faith efforts to employ minority business enterprises as subcontractors and suppliers of materials on such public works project. The Contractor shall include the provisions of subdivision (A)(1) of this section in every subcontract or purchase order entered into to fulfill any obligation of a municipal public works contract or contract for a quasi-public agency project, and such provisions shall be binding on a subcontractor, vendor or manufacturer, unless exempted by regulations or orders of the Commission on Human Rights and Opportunities. The Contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions, including

sanctions for noncompliance in accordance with section 46a-56; provided, if such Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission regarding a state contract, the contractor may request the state of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the state and the state may so enter.

(D) "Minority business enterprise" means any small contractor or supplier of materials fifty-one per cent or more of the capital stock, if any, or assets of which is owned by a person or persons: (1) Who are active in the daily affairs of the enterprise, (2) who have the power to direct the management and policies of the enterprise and (3) who are members of a minority, as such term is defined in subsection (a) of section 32-9n; and "good faith" means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations. "Good faith efforts" shall include, but not be limited to, those reasonable initial efforts necessary to comply with statutory or regulatory requirements and additional or substituted efforts when it is determined that such initial efforts will not be sufficient to comply with such requirements. Determination of the Contractor's good faith efforts shall include, but shall not be eliminated to, the following factors: The contractor's employment and subcontracting policies, patterns and practices; affirmative advertising recruitment and training; technical assistance activities and such other reasonable activities or efforts as the Commission on Human Rights and Opportunities may prescribe that are designed to ensure the participation of minority business enterprises in municipal public works contracts or quasi-public agency projects. "Municipal public works project" means that portion of an agreement entered into on or after October 1, 2015, between any individual, form or corporation and a municipality for the construction, rehabilitation, conversion, extension, demolition or repair of a public building, highway or other changes or improvements in real property, which is financed in whole or in part by the state, including, but not limited to, matching expenditures, grants, loans, insurance or guarantees but excluding any project of an alliance district, as defined in section 10-262u, finance by the state funding in an amount equal to fifty thousand dollars or less. "Quasi-public agency project" means the construction, rehabilitation, conversion, extension, demolition or repair of a building or other changes or improvements in real property pursuant to a contract entered into on or after October 1, 2015, which is financed in whole or in part by a quasi-public agency using state funds, including, but not limited to, matching expenditures, grants, loans, insurance or guarantees.

THE ABOVE REQUIREMENT ONLY APPLIES TO PUBLIC WORKS CONTRACTS EXCEEDING $50,000 AND REQUIRING STATE OF CONNECTICUT FUNDING.

33. PREVAILING WAGE RATES; CONSTRUCTION SAFETY AND HEALTH COURSE:

Except as noted below, the Contractor shall comply with the current provisions of Section 31-53 of the General Statutes of the State of Connecticut, a part of which is quoted as follows:

"The wages paid on an hourly basis to any person performing the work of any mechanic, laborer or worker on the work herein contracted to be done and the amount of payment or contribution paid or payable on behalf of each such person to any employee or welfare fund, as defined in subsection (h) of section 31-53 of the General Statutes, shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the town in which such public works project is being constructed. Any contractor who is not obligated by agreement to make payment or contribution on behalf of such persons to any such employee welfare fund shall pay to each mechanic, laborer or worker as part of such person's wages the amount of payment or contribution for such person's classification on each pay day."

All Contractors and subcontractors shall submit certified weekly payrolls, on forms furnished by the Town, for all contracts meeting the aforementioned monetary limits. The certified payrolls shall be submitted with the Contractor's monthly certificate for payment.

Section 31-55a of the General Statutes of the State of Connecticut provides that the prevailing wage rates applicable to any awarded contract or subcontract are subject to annual adjustments each July 1st for the duration of the project.

Each Contractor that is awarded a contract shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the Contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's web site. The annual adjustments will be posted on the Department's of Labor web page: www.ctdol.state.ct.us. For those without Internet access, contact the division listed below.

The Contractor shall also furnish proof with the weekly certified payroll for the first week each employee begins work that any person performing the work of a mechanic, laborer or worker has completed a course of at least ten (10) hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration in accordance with Connecticut General Statutes Section 31-53b and regulations adopted by the State of Connecticut Labor Commissioner.

The provisions of this section (32) shall not apply where the total cost of all work to be performed by all Contractors and subcontractors in connection with new construction of any public works project is less than four hundred thousand dollars ($400,000) or where the total cost of all work to be performed by all contractors and subcontractors in connection with any remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project is less than one hundred thousand dollars ($100,000).

Questions can be directed to the Contract Compliance Unit, Wage and Workplace Standards Division, Connecticut Department of Labor, 200 Folly Brook Blvd., Wethersfield, CT 06109 at 860-263-6790.

34. GOVERNING LAW:

The laws of the State of Connecticut shall govern this Contract and any and all litigation related to this Contract. In the event of litigation related to this Contract, the exclusive forum shall be the State of Connecticut and the exclusive venue for such litigation shall be the Judicial District for Stamford/Norwalk at Stamford.

IN WITNESS, WHEREOF, the parties of the AGREEMENT have hereunto set their hand and seals the day first above written.

TOWN OF GREENWICH, CONNECTICUT

BY_____

THE CONTRACTOR

BY_____

BID BOND

INSTRUCTIONS IN USE OF BOND FORM

1. The Bid Bond form given on the following pages shall be used.

2. The surety on the Bond may be any corporation authorized to act as surety in the State of Connecticut.

3. The full name and business or residence address of each individual party to the Bond shall be inserted in the space provided therefore, and each such party shall sign the Bond with his usual signature on the line opposite the scroll seal.

4. If the principals are partners, their individual names appear in the space provided therefore, with the recital that they are partners composing a firm, naming it, and the Bond shall be executed by a general partner who has been authorized to act on behalf of the partnership.

5. If the principal or surety is a corporation, the name of the state in which incorporated shall be inserted in the space provided therefore and said instrument shall be executed and attested under the corporate seal as indicated in the form. If the corporation has no corporate seal, the fact shall be stated, in which case a scroll of adhesive seal shall appear following the corporate name.

6. The official character and authority of the person or persons executing the Bond for a corporation shall be certified by a proper officer, in lieu of such certificate, there may be attached to the Bond, copies of so much of the records of the corporation as will show the official character and authority of the officers signing, duly certified by a proper office, under the corporate seal, to be true copies.

7. If the principal or surety is a Limited Liability Company (LLC), the names of the members shall appear in the spaces provided therefore, with the recital that they are members of an LLC, naming it, and the Bond shall be executed by a managing member who has been authorized to act on behalf of the LLC. The official character and authority of the person or persons executing the Bond for an LLC shall be certified by a proper managing member. In lieu of such certificate, there may be attached to the Bond, copies of so much of the records of the LLC as will show the official character and authority of the members signing, duly certified by a proper member to be true copies.

8. The date of this Bond must not be prior to the date of the instrument in connection with which it is given.

FORM OF BID BOND

*** BID BOND ***

TOWN OF GREENWICH

_____ Date Bond Executed

_____
Principals

_____
Surety

_____ _____
Penal Sum of Bond (Expressed in Words and Figures) Date of Bid

Know all men by these presents, that we, the principals and surety above named, are held and firmly bound unto the Town of Greenwich, Connecticut, in the penal sum of the amount stated above, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents. The condition of this obligation is such, that whereas the principals have submitted the accompanying Bid, dated as shown above, for

Now, therefore, if the principals shall not withdraw said Bid within the period specified therein after the opening of the same, or if no period be specified, within sixty (60) days after the said opening, and shall within the period specified therefore, or, if no period be specified, within ten (10) days after the prescribed forms are presented to him for signature, execute such further contractual documents, if any, as may be required by the terms of the Bid as accepted, and give bonds with good and sufficient surety or sureties as may be required, for the faithful performance and proper fulfillment of the resulting contract, and for the protection of all persons supplying labor and materials in the prosecution of the work provided for in such contract or in the event of the withdrawal of said Bid within the period specified, or the failure to enter into such contract and give such bonds within the time specified, if the principal shall pay the Town of Greenwich, Connecticut, the difference between the amount specified in said Bid and the amount for which said Town may procure the required work, supplies and services, if the latter amount be in excess of the former, then the above obligation shall be void and of no effect, otherwise to remain in full force and virtue.

In witness whereof, the above-bounden parties have executed this instrument under their several seals on the date indicated above. The name and corporate seal (if applicable) of each corporate party being hereto affixed.

_____
Name of Partnership

_____(SEAL)
Business Address

_____
Partner - (Hereunto Duly Authorized)

IN THE PRESENCE OF

WITNESS INDIVIDUAL PRINCIPAL

1._____ AS TO_____ (SEAL)

2._____ AS TO_____ (SEAL)

3._____ AS TO_____ (SEAL)

4._____ AS TO_____ (SEAL)

****

WITNESS

_____

*
*_____
*CORPORATE / LLC PRINCIPAL
*
*_____
*BUSINESS ADDRESS
* AFFIX
* CORPORATION
* SEAL
*
*_____
*BY - (HEREUNTO DULY AUTHORIZED)
*
*_____
*TITLE

****

WITNESS

_____

*
*_____
*CORPORATE SURETY
*
*_____
*BUSINESS ADDRESS
* AFFIX
* CORPORATION
* SEAL
*
*_____
*BY - (HEREUNTO DULY AUTHORIZED)
*
*_____
*TITLE

****

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, Certify that I am the _____ of the Corporation/Limited Liability Company named as Principal in the within Bond, that _____ _____, who signed the said Bond on behalf of the Principal, was then _____ of _____ said Corporation/Limited Liability Company, that I know his signature and his signature thereto is genuine, and that said Bond was duly signed, sealed (if a Corporation) and attested for and in behalf of said Corporation/Limited Liability Company by authority of its governing body.

_____
(CORPORATE SEAL)

_____
(CORPORATE SECRETARY
OR MANAGING MEMBER)

PERFORMANCE, MAINTENANCE AND PAYMENT BOND

BOND NO._____

KNOW ALL MEN BY THESE PRESENTS. That we_____

_____, as Principal, and

_____

a corporation organized under the laws of the State of _____ and authorized to do business in the State of Connecticut as Surety, are holden and firmly bound jointly and severally unto the TOWN OF GREENWICH, CONNECTICUT, hereafter referred to as the Town, a territorial corporation located in the County of Fairfield, in the penal sum of

_____Dollars ($_____),

to be paid to it or its certain attorney, successors or assigns, to which payment well and truly to be made, we the said Obligors do bind ourselves, and each of us, our heirs, executors, administrators, and successors firmly by these presents.

IN WITNESS WHEREOF we have hereunto set or caused to be set our respective hands, names and seals this

_____ day of _____ 2019.

THE CONDITION OF THIS OBLIGATION IS SUCH, That whereas the above named Principal has entered into a certain written contract with the TOWN OF GREENWICH, CONNECTICUT, dated the _____ day of_____ 2019 for construction of **CONTRACT NO. XXXX**

(Description of work here – Usually the name of the bid) according to the plans and specifications prepared by the **TOWN OF GREENWICH**, which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, if the said Principal shall well and faithfully perform said contract according to its provisions, and fully indemnify and save harmless the Town from all cost and damages which the Town may suffer by reason of failure so to do, and shall pay for all equipment, appurtenances, materials and labor furnished, used or employed in the execution of said contract, and shall indemnify and save harmless the Town from all suits or claims of any nature or description against the Town by reason of any injuries or damages sustained by any person or persons on account of any act or omission of said Principal, his servants or agents, or his subcontractors in the construction of the work or in guarding the work, or on account of the use of faulty or improper materials, or by reason of claims under the Workmen's Compensation Laws or other laws by any employee of the Principal or his subcontractors, or by reason of the use of any patented material, machinery, device, equipment, process, method of construction or design in any way involved in the work, and shall indemnify the Town against such defective workmanship, material and equipment as may be discovered within one (1) year after completion and final acceptance of the work, and shall make good in such defective workmanship and material as may be discovered within said period of one year, then this obligation shall be void, otherwise to remain in full force and effect.

The Surety hereby stipulates and agrees that any modifications, omissions or additions in or to the terms of the aforesaid contract, or in or to the plans or specifications therefor, or any extension of time, shall in no wise affect the obligation of the Surety under this bond, the Surety hereby waiving any and all right to any notice of any such modifications, omissions, changes, additions or extensions.

CONTRACTOR_____

BY_____

SURETY_____

BY_____

STATE OF CONNECTICUT
DEPARTMENT OF REVENUE SERVICES
25 Sigourney Street Ste 2
Hartford CT 06106-5032

SN 2012(2)

SPECIAL NOTICE

2011 Legislative Changes to the Procedures Governing Nonresident Contractors

Purpose: This Special Notice explains the amendments made to Conn. Gen. Stat. §12-430(7) during the 2011 regular session of the Connecticut General Assembly affecting the requirement for nonresident contractors to provide bonds.

This Special Notice has been updated from a previous version to include guidance on remitting to the Department of Revenue Services (DRS) amounts held back from an unverified subcontractor by a prime or general contractor.

Effective Date: Effective for contracts commencing on and after October 1, 2011.

Statutory Authority: Conn. Gen. Stat. §12-430(7) as amended by 2011 Conn. Pub. Acts 61, §66; Conn. Gen. Stat. §12-35; Conn. Gen. Stat. §12-415; Conn. Gen. Stat. §12-430(1).

Overview: The law requiring nonresident construction contractors to furnish security for Connecticut taxes arising from jobs performed in Connecticut has been changed in the following major ways:

- Under the law as amended, there are two classes of nonresident contractors: ***verified*** and ***unverified***. A nonresident prime or general contractor may gain verified status and thus eliminate the requirement to file a surety bond with DRS, and a nonresident subcontractor may become verified and thus eliminate the requirement for the prime or general contractor to hold back a portion of the amount owed the subcontractor under the contract.
- Under the law as amended, a **single** surety bond for 5% of the entire project price is required to be filed with DRS by an unverified prime or general contractor where the contract price for the entire project is $250,000 or more. A person doing business with an unverified prime or general contractor for such a project must obtain proof that the contractor has filed a bond with DRS, but is no longer required to withhold an amount from payment due to the contractor under the contract.
- A prime or general contractor must hold back 5% of the amount due an unverified subcontractor until the subcontractor obtains and furnishes **Form AU-968**, *Certificate of Compliance*, from DRS. A **Form AU-968** authorizes the prime or general contractor to release all or a portion of the amounts held back from payment to the unverified subcontractor.
- Compliance with the provisions of Conn. Gen. Stat. § 12-430(7) relieves the person doing business with a nonresident contractor from liability for the nonresident contractor's withholding tax liability or liability for sales or use tax on materials and consumables. It does not relieve the person doing business with a nonresident contractor from liability for sales or use tax on purchases of services.

Prior law required compliance with one of three options to secure payment of Connecticut taxes for each contract with a nonresident prime or general contractor and with a nonresident subcontractor. This is now replaced by the procedures described above.

As under prior law, owners or tenants of residential real property are excluded from the requirements of Conn. Gen. Stat. §12-430(7).

Definitions:

Nonresident contractor means a contractor or subcontractor who does not maintain a regular place of business in Connecticut.

Resident contractor means a contractor or subcontractor who maintains a regular place of business in Connecticut.

Regular place of business means:

- Any bona fide office, factory, warehouse, or other space in Connecticut at which a contractor is doing business in its own name in a regular and systematic manner; **and** that is
- A place continuously maintained, occupied, and used by the contractor in carrying on its business through its employees regularly in attendance to carry on the contractor's business in the contractor's own name.

A regular place of business **does not include**:

- A place of business for a statutory agent for service of process or a temporary office whether or not it is located at the site of construction;
- Locations used by the contractor only for the duration of the contract, such as short-term leased offices, warehouses, storage facilities, or facilities that do not have full time staff with regular business hours; **or**
- An office maintained, occupied, and used by a person affiliated with a contractor.

Verified contractor means a nonresident contractor or subcontractor who:

- Is registered for all applicable taxes with DRS;
- Has filed all required tax returns with DRS;
- Has no outstanding tax liabilities to DRS; **and**
- Has submitted a **Form AU-960**, *Nonresident Contractor Request for Verified Contractor Status*, and has been verified by DRS to meet the above requirements, plus either:
    1. Has been registered for all applicable taxes with DRS for at least three years preceding the contract; **or**
    2. Posts with DRS a good and valid verification bond using **Form AU-961**, *Verification Bond*.

Unverified contractor means a nonresident contractor or subcontractor who is not a verified contractor.

Subcontractor means a person who is engaged in contracting real property work and who contracts with a prime or general contractor to perform all or any part of the contract of the prime or general contractor, or who contracts with a subcontractor who has contracted to perform any part of the contract entered into by the prime or general contractor.

Prime or general contractor includes (i) any person who contracts with the owner, lessee or other person having authority to enter into a contract involving the premises or property that is the subject matter of the contract, to perform services or furnish materials, or both, for the construction, alteration or improvement of any real property or project, or (ii) any person who owns or leases real estate for the purpose of developing the real estate other than for his or her own occupancy, and who, in the development of the real estate, contracts, alters or makes improvements on it.

Contract price means the total contract price, including deposits, amounts held as retainage, costs for any change orders, or charges for add-ons.

Person doing business with a nonresident contractor (referred to below as *customer*) means **any** person who makes payments of the contract price to a nonresident contractor, and includes, but is not limited to property owners, governmental, charitable or religious entities, and resident or nonresident general contractors or subcontractors. An owner or tenant of residential real property is not a person doing business with a nonresident contractor and is not required to comply with the provisions of Conn. Gen. Stat. §12-430(7).

Commencement of the contract means the time when the nonresident contractor signs the contract, but, in any event, occurs no later than when the work under the contract actually starts. If a change order is made after the commencement of the original contract, the change order commences when it is signed by the nonresident contractor, but, in any event, occurs no later than when the work under the change order actually starts.

Completion of the contract means the time when the nonresident contractor makes the final periodic billing for the contract. The final periodic billing may be due before payment of any retainage becomes due. If a change order is made after the final periodic billing for the original contract, the change order is complete when the nonresident contractor bills for the change.

Residential real property means real property used exclusively for residential purposes and consisting of three or fewer dwelling units in one of which the owner or tenant resides.

Certificate of compliance means a certificate issued to an unverified subcontractor by DRS, exonerating

the subcontractor from sales or use taxes owed by the subcontractor under Chapter 219 of the Connecticut General Statutes and any income tax withholding owed by the subcontractor pursuant to Chapter 229 of the Connecticut General Statutes, but only to the extent that these taxes arise from the activities of the subcontractor on the project for which the certificate was required.

Customer of an Unverified Prime or General Contractor: The customer of an unverified prime or general contractor must obtain proof that the contractor has posted a surety bond with DRS. Failure to do so leaves the customer liable for payment of any sales and use taxes and any income tax withholding owed by the unverified contractor arising from the activities of the contractor on the project, up to 5% of the contract price required to be paid to the unverified contractor.

However, compliance with the provisions of Conn. Gen. Stat. §12-430(7) does not relieve the customer of the customer's liability for use taxes due on purchases of services from the unverified contractor.

Unverified Prime or General Contractor Must File a Bond: An unverified prime or general contractor must file a surety bond with DRS in an amount equal to 5% of the contract price. DRS has issued **Form AU-964**, *Surety Bond and Release*, which must be used to post that bond.

DRS will release the surety bond once the contract is complete and the unverified prime or general contractor establishes that it has paid all taxes it owes in connection with the contract and that its unverified subcontractors have paid all of the taxes that they owe in connection with the contract.

Otherwise, DRS will release the surety bond once the contract is complete and the unverified prime or general contractor establishes that it has:

1. Paid all taxes it owes in connection with the contract;
2. Held back an amount equal to 5% of the payments being made by the contractor in connection with the contract to its unverified subcontractors; **and**
3. Paid over amounts held back from unverified contractors to the extent that DRS has issued certificates of compliance for full or partial release of such amounts, and remitted to DRS any amounts held back that have not been authorized by DRS to be released to the unverified contractors. See the section of this publication titled *Release or Remittance of Amounts Held Back*, for the procedures to release held back payments to the unverified subcontractors.

Hold Backs Required by All Prime or General Contractors from Payments to Unverified Subcontractors: Prime or general contractors, whether resident, verified, or unverified, doing business with unverified subcontractors on projects over $250,000 must hold back an amount equal to 5% of the payments required to be made to the subcontractor until the subcontractor provides a *Certificate of Compliance* authorizing full or partial release of the amount held back.

The prime or general contractor must provide notice of the requirement to hold back to the unverified subcontractor not later than the time of commencement of work under the contract by the subcontractor.

The amount held back from unverified subcontractors is deemed to be held in a special fund in trust for the state. An unverified subcontractor does not have any right of action against a prime or general contractor with respect to any amount held back in compliance or intended compliance with Conn. Gen. Stat. §12-430(7).

Release or Remittance of Amounts Held Back: When all work is completed under a contract, the amount held back will be released to the unverified subcontractor or remitted to DRS depending on the following:

1. Unverified subcontractor **DOES** submit **Form AU-967**, *Request for Certificate of Compliance*, to DRS:

   An unverified subcontractor requests DRS to issue Form AU-968 by submitting Form AU-967. DRS will review the request in the context of generally accepted construction industry cost guidelines for the scope and type of construction project. DRS will issue one of the following not later than 120 days after Form AU-967 and all required documents are received:

A. Certificate of Compliance (AU-968):

   If DRS issues Form AU-968, to the unverified subcontractor and the prime or general contractor authorizing full or partial release of held back amounts, the prime or general contractor must pay over the released amount to the subcontractor and must remit any unreleased amount to DRS. The prime or general contractor remits the unreleased

amount on **Form OS-114**, *Sales and Use Tax Return*, Line 6 on the first return due after the issuance of the Certificate of Compliance.

B. Denial of Certificate of Compliance and Remittance of Holdback (AU-970)

If DRS denies the request a **Form AU-970**, *Denial of Certificate of Compliance and Remittance of Holdback*, will be issued to the unverified subcontractor and the prime or general contractor. The prime or general contractor must remit the total amount held back to DRS on Form OS-114, Line 6. This held back amount must be reported on the first return due after the issuance of the Denial of Certificate of Compliance and Remittance of Holdback.

2. Unverified subcontractor **DOES NOT** submit Form AU-967 to DRS.

If the unverified nonresident subcontractor does not submit Form AU-967 to the prime or general contractor for endorsement within 90 days of the completion date, then the prime or general contractor must remit the amount held back to DRS on Form OS-114, Line 6, on the first return due after the 90 day period following the completion of the contract.

The calculation used to arrive at the amount to be included on Form OS-114, Line 6 is:

Amount Held Back / .0635	= Taxable Amount to be included on Line 6

Example: If the Total Contract Amount is $300,000, then the Amount Held Back is $15,000 (300,000 X .05). The amount to be included on Line 6 is $236,220.47 (15,000 / .0635).

The prime or general contractor will not be liable for any claim by DRS for taxes of the unverified subcontractor arising from the activities of the subcontractor on the project when the prime or general contractor pays over to the subcontractor the amount authorized by the Form AU 968. Furthermore, when the prime or general contractor pays over to DRS the unreleased hold back amount, the prime or general contractor will not be liable for any claim by the subcontractor for the amount paid over to DRS.

The prime or general contractor doing business with the nonresident contractor must keep supporting documentation with the tax return on which it was reported. If the prime or general contractor fails to timely remit to DRS any amount that was unclaimed by, or not released by DRS to the unverified subcontractor, the prime or general contractor will be subject to applicable interest and penalties under Chapter 219 of the Connecticut General Statutes.

Disclosures by DRS Authorized under Conn. Gen. Stat. §12-430(7): Notwithstanding the provisions regarding confidentiality of tax return information under Conn. Gen. Stat. §12-15, DRS is authorized to:

- Verify whether or not a nonresident contractor or subcontractor is a verified contractor;
- Disclose to a person doing business with an unverified subcontractor who is required to hold back amounts from payments to the unverified contractor whether a Form AU-986 has been requested by or issued to the subcontractor by DRS; DRS may disclose a copy of the certificate to the person doing business with the unverified subcontractor;
- Disclose to a person doing business with an unverified prime or general contractor whether a good and valid surety bond has been posted with DRS; **and**
- Verify whether or not any contractor or subcontractor is a resident contractor.

Effect on Other Documents: This Special Notice modifies and supersedes **Special Notice 2011(17)**, *2011 Legislative Changes to the Procedures Governing Nonresident Contractors*, and modifies and supersedes **Informational Publication 2006(35)**, *Building Contractors' Guide to Sales and Use Taxes*, to the extent it discusses the provisions of Conn. Gen. Stat. §12-430(7).

Effect of This Document: A Special Notice announces a new policy or practice in response to changes in state or federal laws or regulations or to judicial decisions. A Special Notice indicates an informal interpretation of Connecticut tax law by DRS.

For Further Information: Call DRS during business hours, Monday through Friday:

- **1-800-382-9463** (Connecticut calls outside the Greater Hartford calling area only); **or**
- **860-297-5962** (from anywhere).

TTY, TDD, and Text Telephone users only may transmit inquiries anytime by calling 860-297-4911.

For questions regarding the nonresident contractor bond law, call **860-541-7538**.

Forms and Publications: Visit the DRS website at **www.ct.gov/DRS** to download and print Connecticut tax forms and publications.

Paperless Filing/Payment Methods (fast, easy, free, and confidential):

Business and individual taxpayers can use the **Taxpayer Service Center** (*TSC*) at **www.ct.gov/TSC** to file a variety of tax returns, update account information, and make payments online.

File Electronically: You can choose to get first-time filer information and filing assistance, or can log directly into the ***TSC*** to file returns and pay taxes.

Pay Electronically: You can pay taxes for tax returns that cannot be filed through the ***TSC***. Log in and select the **Make Payment Only** option. Designate a payment date up to the due date of the tax and mail a paper return to complete the filing process.

DRS E-Alerts Service: Get connected to the latest news from DRS. Receive notification by email of changes to legislation, policies, and procedures. **DRS E-Alerts** provide information for employer's withholding tax, News – Press Releases, and Top 100 Delinquency List. Visit the DRS website at **www.ct.gov/DRS** and select e-alerts from the left navigation bar.

SN 2012(2)
Sales and use taxes
Withholding tax
Contractor bonds
Issued: 03/22/2012

Department of Revenue Services
Compliance Support Unit
25 Sigourney Street Ste. 2
Hartford CT 06106-5032
New (10/01/2011)

Form AU-964
Surety Bond and Release

Purpose: A registered nonresident prime or general contractor working in Connecticut, and a surety company licensed to do business in Connecticut, use **Form AU-964** to post a surety bond for a specific project over $250,000 to ensure all taxes due to the State of Connecticut from the contract, including all subcontractors directly under the prime or general contractor are paid to Department of Revenue Services (DRS). Read the instructions on the reverse side before you complete this form. If you need assistance, call **860-541-7538,** Monday through Friday, during business hours.

Part I: Nonresident Prime or General Contractor Information

Name	Connecticut Tax Registration No.
Address (Street or PO Box, City, State, and ZIP Code)	

Part II: Customer of Nonresident Prime or General Contractor (owner, lessee, or other person having authority to enter into a contract)

Name	Address (Street or PO Box, City, State, and ZIP Code)

Part III: Surety Company Information

Name	Bond No.	Bond Amount, 5% of Total Contract Price
Address (Street or PO Box, City, State, and ZIP Code)		

Part IV: Project Information ☐ Check if this bond is for a change order.

Physical Location of Project (Street, City or Town)		Name of Project
Commencement Date	Completion Date	Total Contract Price not to be less than $250,000

Conditions of the obligation for the project detailed above:

- The nonresident prime or general contractor has entered into a contract related to real property at a Connecticut location for a contract price of $250,000 or more.
- The nonresident prime or general contractor and the surety company are posting a bond of 5% of the total contract price, including any change orders and add-ons, with DRS to ensure that all taxes that become due and owing during the period of the contract will be paid.
- If the nonresident prime or general contractor pays all taxes, interest, and penalties within three years from the last day of the month succeeding the reporting period in which the contractor posted the bond, the bond expires; otherwise the obligation remains in full force.
- This bond jointly and severally binds the nonresident prime or general contractor and the surety company, their heirs, executors, administrators, successors, and assigns for payment of this obligation.

Nonresident Prime or General Contractor Declaration: I, an authorized agent of the nonresident prime or general contractor, declare under the penalty of law that I have examined Form AU-964 and, to the best of my knowledge and belief it is true, complete, and correct. I understand the penalty for willfully delivering a false document or return to DRS is a fine of not more than $5,000, or imprisonment for not more than five years, or both.

Print Name	Title
Authorized Signature	Date

Surety Company Declaration: I, an authorized agent of the surety company named above, declare under the penalty of law that I have examined this Form AU-964 and, to the best of my knowledge and belief it is true, complete, and correct. I understand the penalty for willfully delivering a false document or return to DRS is a fine of not more than $5,000, or imprisonment for not more than five years, or both.

Print Name	Title	Raised Seal:
Authorized Signature	Date	

~~ For DRS Use Only ~~

Release by Authorized DRS Agent: I, an authorized agent of the DRS, have examined the tax liabilities covered by this Form AU-964 and am releasing the nonresident prime or general contractor named above and the surety named from this bond related to the project and timeframe described above. The DRS will retain the original copy of this form.

Print Name	Title	Stamp:
Authorized Signature	Date	

Instructions

Part I: Enter the name and complete address of the nonresident prime or general contractor furnishing the bond. Include the nonresident prime or general contractor's Connecticut tax registration number.

Part II: Enter the name and complete address of the customer of the nonresident prime or general contractor.

Part III: Enter the name and complete address of the surety company that guarantees this bond. Include the bond number and bond amount, which must be 5% of the total contract price.

Part IV: Check the box if the bond is for a change order occurring after the bond for the initial contract was furnished to DRS. Enter the name of the project and the complete address including the street address and the city or town where the project is physically located. Enter the commencement date of this project or change order. Enter the date by which the nonresident prime or general contractor is expected to complete work on this project or change order. Enter, in words and figures, the total amount to be paid to the nonresident prime or general contractor under the contract. Indicate if this amount is an estimate. This amount cannot be for a contract less than $250,000.

Declarations: An authorized representative for the nonresident prime or general contractor and the surety company must sign and date the declaration on Form AU-964. The name of the nonresident prime or general contractor and the surety company must be exactly as it appears on the bond. The raised corporate seal of the surety company must be affixed by its signature on Form AU-964.

Project: RFB#7527 Town Hall Parking Garage Rehabilitation

Minimum Rates and Classifications
for Building Construction

ID# : B 26622

Connecticut Department of Labor
Wage and Workplace Standards Division

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number: Project Town: Greenwich
State# FAP#:

Project: RFB#7527 Town Hall Parking Garage Rehabilitation

CLASSIFICATION	Hourly Rate	Benefits
1a) Asbestos Worker/Insulator (Includes application of insulating materials, protective coverings, coatings, & finishes to all types of mechanical systems; application of firestopping material for wall openings & penetrations in walls, floors, ceilings	38.25	27.96
1b) Asbestos/Toxic Waste Removal Laborers: Asbestos removal and encapsulation (except its removal from mechanical systems which are not to be scrapped), toxic waste removers, blasters.**See Laborers Group 7**		
1c) Asbestos Worker/Heat and Frost Insulator	40.21	30.99

As of: **Wednesday, October 16, 2019**

Project: RFB#7527 Town Hall Parking Garage Rehabilitation

2) Boilermaker	38.34	26.01
3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	34.72	33.58 + a
3b) Tile Setter	34.90	25.87
3c) Terrazzo Mechanics and Marble Setters	31.69	22.35
3d) Tile, Marble & Terrazzo Finishers	26.70	21.75
3e) Plasterer	33.48	32.06

As of: **Wednesday, October 16, 2019**

Project: RFB#7527 Town Hall Parking Garage Rehabilitation

------LABORERS------

4) Group 1: Laborers (common or general), acetylene burners, concrete specialists, wrecking laborers, fire watchers.	30.75	20.84
4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofer/mixer/nozzleman (Person running mixer and spraying fireproof only).	31.00	20.84
4b) Group 3: Jackhammer operators/pavement breaker, mason tender (brick), mason tender (cement/concrete), forklift operators and forklift operators (masonry).	31.25	20.84
4c) **Group 4: Pipelayers (Installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license) (the pipelayer rate shall apply only to one or two employees of the total crew who primary task is to actually perform the mating of pipe sections) P6 and P7 rate is $26.80.	31.75	20.84
4d) Group 5: Air track operator, sand blaster and hydraulic drills.	31.50	20.84

Project: RFB#7527 Town Hall Parking Garage Rehabilitation

4e) Group 6: Blasters, nuclear and toxic waste removal.	33.75	20.84
4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped).	31.75	20.84
4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew.	29.03	20.84
4h) Group 9: Top men on open air caisson, cylindrical work and boring crew.	28.49	20.84
4i) Group 10: Traffic Control Signalman	18.00	20.84
5) Carpenter, Acoustical Ceiling Installation, Soft Floor/Vinyl Floor/Carpet Laying, Metal Stud Installation, Form Work and Scaffold Building, Drywall Hanging, Modular-Furniture Systems Installers, Lathers, Piledrivers, Resilient Floor Layers.	33.53	25.66

As of: **Wednesday, October 16, 2019**

Project: RFB#7527 Town Hall Parking Garage Rehabilitation

5a) Millwrights	34.04	26.09
6) Electrical Worker (including low voltage wiring) (Trade License required: E1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	40.00	36.15
7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	53.37	33.705+a+b
-----LINE CONSTRUCTION----		
Groundman	26.50	6.5% + 9.00
Linemen/Cable Splicer	48.19	6.5% + 22.00

As of: **Wednesday, October 16, 2019**

Project: RFB#7527 Town Hall Parking Garage Rehabilitation

8) Glazier (Trade License required: FG-1,2)	38.18	21.80 + a
9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	36.67	35.77
----OPERATORS----		
Group 1: Crane handling or erecting structural steel or stone, hoisting engineer 2 drums or over, front end loader (7 cubic yards or over), work boat 26 ft. and over and Tunnel Boring Machines. (Trade License Required)	40.97	24.80 + a
Group 2: Cranes (100 ton rate capacity and over); Excavator over 2 cubic yards; Piledriver ($3.00 premium when operator controls hammer); Bauer Drill/Caisson. (Trade License Required)	40.64	24.80 + a
Group 3: Excavator; Backhoe/Excavator under 2 cubic yards; Cranes (under 100 ton rated capacity), Grader/Blade; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar);Grader Operator; Bulldozer Fine Grade. (slopes, shaping, laser or GPS, etc.). (Trade License Required)	39.88	24.80 + a

As of: **Wednesday, October 16, 2019**

Project: RFB#7527 Town Hall Parking Garage Rehabilitation

Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper).	39.48	24.80 + a
Group 5: Specialty Railroad Equipment; Asphalt Paver; Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24" Mandrell)	38.87	24.80 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller; Pile Testing Machine.	38.87	24.80 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	38.55	24.80 + a
Group 7: Asphalt roller, concrete saws and cutters (ride on types), vermeer concrete cutter, Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24" and under Mandrell).	38.20	24.80 + a
Group 8: Mechanic, grease truck operator, hydroblaster; barrier mover; power stone spreader; welding; work boat under 26 ft.; transfer machine.	37.79	24.80 + a

As of: **Wednesday, October 16, 2019**

Project: RFB#7527 Town Hall Parking Garage Rehabilitation

Group 9: Front end loader (under 3 cubic yards), skid steer loader regardless of attachments, (Bobcat or Similar): forklift, power chipper; landscape equipment (including Hydroseeder).	37.34	24.80 + a
Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc.	35.24	24.80 + a
Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.	35.24	24.80 + a
Group 12: Wellpoint operator.	35.18	24.80 + a
Group 13: Compressor battery operator.	34.58	24.80 + a
Group 14: Elevator operator; tow motor operator (solid tire no rough terrain).	33.41	24.80 + a

As of: **Wednesday, October 16, 2019**

Project: RFB#7527 Town Hall Parking Garage Rehabilitation

Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	32.99	24.80 + a
Group 16: Maintenance Engineer/Oiler.	32.32	24.80 + a
Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator.	36.76	24.80 + a
Group 18: Power safety boat; vacuum truck; zim mixer; sweeper; (Minimum for any job requiring a CDL license).	34.26	24.80 + a
------PAINTERS (Including Drywall Finishing)------		
10a) Brush and Roller	34.62	21.80

As of: **Wednesday, October 16, 2019**

Project: RFB#7527 Town Hall Parking Garage Rehabilitation

10b) Taping Only/Drywall Finishing	35.37	21.80
10c) Paperhanger and Red Label	35.12	21.80
10e) Blast and Spray	37.62	21.80
11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	43.62	32.06
12) Well Digger, Pile Testing Machine	37.26	24.05 + a
Roofer: Cole Tar Pitch	41.50	17.00 + a

As of: **Wednesday, October 16, 2019**

Roofer: Slate, Tile, Composition, Shingles, Singly Ply and Damp/Waterproofing	40.00	17.00 + a	
15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	44.74	42.48	
16) Pipefitter (Including HVAC work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4, G-1, G-2, G-8 & G-9)	43.62	32.06	
------TRUCK DRIVERS------			
17a) 2 Axle	29.51	24.52 + a	
17b) 3 Axle, 2 Axle Ready Mix	29.62	24.52 + a	

As of: **Wednesday, October 16, 2019**

Project: RFB#7527 Town Hall Parking Garage Rehabilitation

17c) 3 Axle Ready Mix	29.67	24.52 + a
17d) 4 Axle, Heavy Duty Trailer up to 40 tons	29.72	24.52 + a
17e) 4 Axle Ready Mix	29.77	24.52 + a
17f) Heavy Duty Trailer (40 Tons and Over)	29.98	24.52 + a
17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	29.77	24.52 + a
18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	45.57	24.33 + a

As of: **Wednesday, October 16, 2019**

Project: RFB#7527 Town Hall Parking Garage Rehabilitation

19) Theatrical Stage Journeyman	25.76	7.34

As of: **Wednesday, October 16, 2019**

Project: RFB#7527 Town Hall Parking Garage Rehabilitation

Welders: Rate for craft to which welding is incidental.

**Note: Hazardous waste removal work receives additional $1.25 per hour for truck drivers.*

***Note: Hazardous waste premium $3.00 per hour over classified rate*

ALL Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra $4.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone; hoisting engineer (2 drums or over)

2) Cranes (100 ton rate capacity and over) Bauer Drill/Caisson

3) Cranes (under 100 ton rated capacity)

Crane with 150 ft. boom (including jib) - $1.50 extra
Crane with 200 ft. boom (including jib) - $2.50 extra
Crane with 250 ft. boom (including jib) - $5.00 extra
Crane with 300 ft. boom (including jib) - $7.00 extra
Crane with 400 ft. boom (including jib) - $10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyperson instructing and supervising the work of each apprentice in a specific trade.

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.

Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.

The annual adjustments will be posted on the Department of Labor's Web page: www.ct.gov/dol. For those without internet access, please contact the division listed below.

The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.

All subsequent annual adjustments will be posted on our Web Site for contractor access.

Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

As of: **Wednesday, October 16, 2019**

Project: RFB#7527 Town Hall Parking Garage Rehabilitation

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

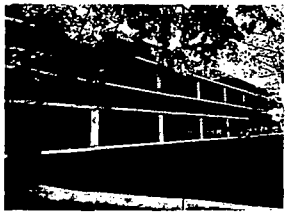
Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

As of: **Wednesday, October 16, 2019**

RFB #7527

EXHIBIT I

GREENWICH TOWN HALL
PARKING GARAGE RESTORATION

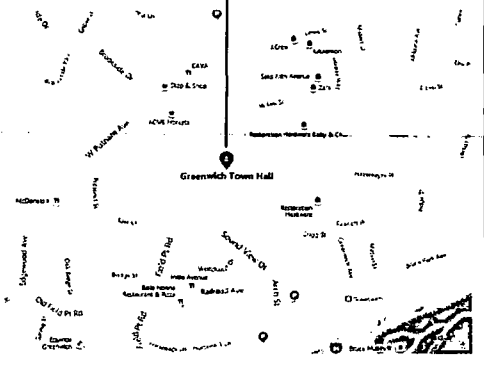


Owner :
Greenwich Town Hall
101 Field Point Road
Greenwich, CT 06830
Tel. (203) 622-7712
Contact: Blaize Levitan

Architect, Structural Engineer, Parking Consultant :
Timothy Haahs & Associates, Inc.
550 Township Line Road
Suite 100
Blue Bell, PA 19422
Tel. (484) 342-0200
Contact: Mr. Jordan Rappin, P.E.

Location Map

Greenwich Town Tall
Parking Garage
Field Point Road & Dayton Ave
Greenwich, CT



DRAWING INDEX

TimHaahs

Issued for Bid
SEPTEMBER 27, 2019

RFB #7527

EXHIBIT I

GENERAL NOTES

A. GENERAL

1. IT IS THE INTENT OF THE PLANS TO ADEQUATELY DESCRIBE AND INDICATE AREAS THAT REQUIRE RESTORATION WORK BASED ON A PRIORITIZED REPAIR PROGRAM THAT WILL EXTEND OVER MULTIPLE YEARS. IN THE EVENT IT BECOMES NECESSARY TO ALTER THE PLANS FOR THE BEST INTEREST OF THE PROJECT OR TO CIRCUMSTANCES NOT KNOWN AT THE TIME OF SURVEY, WORK QUANTITIES MAY BE ADJUSTED IN ACCORDANCE WITH THE ENGINEER AND OWNER'S APPROVAL.

2. CONTRACTOR IS RESPONSIBLE FOR VERIFYING EXISTING CONDITIONS PRIOR TO COMMENCING WORK AND SHALL REPORT IN WRITING TO THE ENGINEER ALL DISCREPANCIES WITH RESPECT TO DRAWINGS & SPECIFICATIONS

3. CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF ALL BRACING, SHEETING, AND SHORING AS REQUIRED. PROVIDE TEMPORARY SUPPORT WHERE REPAIR WORK WILL DEGRADE THE INTEGRITY OF THE STRUCTURE INCLUDING CONNECTIONS. SHORING SHALL BE DESIGNED, PREPARED, SIGNED, AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF CONNECTICUT, HIRED BY THE CONTRACTOR. SHORING ENGINEER SHALL FIELD VERIFY ALL DIMENSIONS, CONNECTION TYPES, ETC AS NEEDED TO DETERMINE ALL APPLICABLE LOADING AND LOAD PATHS.

4. CONTRACTOR SHALL MEET WITH OWNER, FACILITY OPERATOR, & ENGINEER PRIOR TO STARTING WORK TO REVIEW SHORING LOCATIONS, TRAFFIC FLOW, CONSTRUCTION PHASING, ETC. PROVIDE TEMPORARY FENCING, BARRICADES, SIGNAGE, ETC., AS REQUIRED FOR TEMPORARY TRAFFIC FLOW AND TO ASSURE PUBLIC SAFETY.

5. CONTRACTOR IS REQUIRED TO INSTALL A TEMPORARY DUST ENCLOSURE AT EACH AREA OF WORK TO PREVENT DUST & ODOR MIGRATION. FOR BIDDING PURPOSES, ASSUME A CONTINUOUS PLASTIC SEAL AT THE PERIMETER OF EACH WORK AREA. ALL DUST/DEBRIS FROM THE WORK SHALL BE CLEANED/REMOVED PRIOR TO REMOVING TEMPORARY ENCLOSURE. REPAIR WORK THAT CREATES NOISE AND ODOR (FROM POWER TOOLS, VIBRATIONS, PRODUCT INSTALLATION, OR OTHERWISE) SHALL BE PERFORMED DURING NORMAL BUSINESS HOURS.

6. CONDUCT A PRECONSTRUCTION MEETING PRIOR TO COMMENCING WORK. HOLD PROGRESS/ALLABOM MEETINGS PRIOR TO EACH PHASE OF THE PROJECT, AND HOLD REGULAR COORDINATION MEETINGS

7. CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY CONDITION WHICH MAY ENDANGER THE STABILITY AND STRUCTURAL INTEGRITY OF, CAUSE DISTRESS TO, OR COMPROMISE THE DURABILITY OF THE STRUCTURE.

8. CONTRACTOR SHALL REFER TO THE SPECIFICATIONS FOR INFORMATION NOT COVERED BY THE DRAWINGS. IN CASE OF CONFLICT BETWEEN DRAWINGS AND SPECIFICATIONS, THE MOST STRINGENT REQUIREMENTS SHALL GOVERN.

9. THE RESTORATION WORK SHALL BE GOVERNED BY ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES AND ORDINANCES INCLUDING FIRE CODES, VOLATILE ORGANIC COMPOUND (VOC) REQUIREMENT, ETC

10. INCLUDE COLD WEATHER PROVISIONS AS REQUIRED TO COMPLETE THE WORK.

B. GENERAL SURFACE PREPARATION

1. THE DRAWINGS INDICATE THE AREAS THAT HAVE BEEN DETERMINED TO REQUIRE REPAIR PER FIELD SURVEYS. CONTRACTOR SHALL SOUND SURFACES WITH HAMMER, ROD, CHAIN, OR APPROPRIATE TOOLS TO DETECT DELAMINATIONS AND SPALLS. ALL SUPPORTED STRUCTURAL ELEMENTS WITHIN THE GARAGE SHALL BE SOUNDED. THE LIMITS OF THE DELAMINATIONS SHALL BE MARKED FOR DEMOLITION PRIOR TO REMOVAL. LIMITS OF REPAIR AREA SHALL BE REVIEWED BY ENGINEER IN THE FIELD. REPAIR QUANTITIES THAT DEVIATE FROM THAT SHOWN ON PLAN SHALL BE REPORTED IN WRITING TO THE ENGINEER AND OWNER FOR APPROVAL

2. SAWCUT EDGES TO AVOID FEATHERED EDGES. REMOVE SPALLED AND UNSOUND CONCRETE WITHIN MARKINGS. EXTEND REPAIR AREAS WITH THE APPROVAL OF ENGINEER AND OWNER IF ADDITIONAL UNSOUND CONCRETE IS ENCOUNTERED. THE REPAIR EDGE SHALL BE EXTENDED A MINIMUM OF THREE INCHES BEYOND THE EXTENT OF CORRODED REINFORCING STEEL.

3. ALL REINFORCING IN GOOD CONDITION (SECTION LOSS LESS THAN 20%) WITHIN THE REPAIR AREA SHALL BE UNDERCUT, SANDBLASTED CLEAN AND TREATED WITH CORROSION INHIBITING COATING MATERIALS PER SPECIFICATIONS. ALL REINFORCING WITH SECTION LOSS GREATER THAN 20% WITHIN THE REPAIR AREA SHALL BE REPLACED, WITH EQUAL REINFORCEMENT; DEVELOP TENSILE STRENGTH OF REPLACEMENT REINFORCEMENT BY SPLICING TO REINFORCING IN "GOOD CONDITION" OR BY DOWELING INTO SOUND CONCRETE AT PERIMETER OF REPAIR AREA USING ADHESIVE EPOXY ANCHORING SYSTEM

4. WATERBLAST OR SANDBLAST THE CAVITY SURFACES TO REMOVE ALL DEBRIS AND CONTAMINANTS. AIRBLAST AS THE FINAL STEP TO REMOVE REMAINING DEBRIS

C. CONCRETE REMOVAL BY CHIPPING

1. CHIPPING HAMMERS SHALL BE SIZED SO THAT THE UNSOUND CONCRETE CAN BE REMOVED IN AN EFFICIENT MANNER WITHOUT DAMAGING THE ADJACENT SOUND CONCRETE. DO NOT CUT INTO OR DAMAGE EMBEDDED REINFORCING AND OTHER EMBEDDED ITEMS SUCH AS CONDUITS

2. CHIPPING SHALL CONTINUE UNTIL ALL UNSOUND CONCRETE HAS BEEN REMOVED PER REPAIR DETAIL SHEET NOTES.

D. CONCRETE (FOR REPAIRS GREATER THAN 3 INCHES THICK)

1. CONCRETE SHALL MEET THE FOLLOWING CRITERIA

   STRENGTH: 5000 PSI (MIN.)

   MAXIMUM W/C RATIO OF 0.4

   PORTLAND CEMENT CONCRETE (REGULAR OR HI-EARLY), TYPE I OR III

   AGGREGATE TO CONFORM TO ASTM C33

   AGGREGATE: #3, ⅜ INCH

   SUPERPLASTICIZED

   AIR ENTRAINED: 6.0±1.5%

   SLUMP: 4±1 INCH (BEFORE ADDING SUPERPLASTICIZER)

   SYNTHETIC FIBER: 1.5 LB./C.Y. OF CONCRETE, MINIMUM

   3 GAL. OF CALCIUM NITRITE CORROSION INHIBITOR PER CU. YD. OF CONC.

2. CONTRACTOR SHALL SUBMIT MIX DESIGN FOR ENGINEER'S APPROVAL. ADMIXTURES SHALL NOT BE CHANGED FROM THE APPROVED MIX DESIGN WITHOUT THE ENGINEER'S APPROVAL.

3. CONFORM TO THE REQUIREMENTS OF ACI 301 AND ACI 318, LATEST EDITION.

4. THE FIELD QUALITY CONTROL TESTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING AGENCY HIRED BY OWNER.

   AIR ENTRAINMENT AND SLUMP TESTS FOR EVERY BATCH.

   COMPRESSION STRENGTH TESTS ON EVERY 50 C.Y. POUR AND IN ACCORDANCE WITH ACI 318, LATEST EDITION.

5. PREPARE THE SCARIFIED CONCRETE SUBSTRATE TO RECEIVE NEW REPAIR MORTAR/CONCRETE, INCLUDING APPLYING APPLICABLE BONDING AGENT OR PREPARING THE SURFACE TO A SATURATED SURFACE DRY (AS DEFINED BY ICRI). IF A MORTAR SCRUB COAT IS USED, COMPLY WITH ICRI AND THE MANUFACTURER'S RECOMMENDATIONS. IF A BONDING AGENT IS USED ASSURE THAT CONCRETE IS PLACED WITHIN THE OPEN TIME AS DOCUMENTED BY THE MANUFACTURER, WITH CONSIDERATION OF TEMPERATURE AND HUMIDITY.

6. CONCRETE SHALL BE CONSOLIDATED AND CURED PER SPECIFICATIONS. IF CURING COMPOUND IS USED, IT SHALL BE REMOVED BY WATER-BLASTING OR SHOT-BLASTING PRIOR TO THE APPLICATION OF SURFACE WATERPROOFING MEASURES

7. FOR CONCRETE REPAIRS LESS THAN OR EQUAL TO 3 INCHES THICK, USE CEMENTITIOUS PATCHING MATERIAL PER SPECIFICATION SECTION 039300.

E. REINFORCEMENT

1. ALL NEW REINFORCEMENT SHALL COMPLY WITH ASTM A615 GR. 60.

2. WELDED WIRE FABRIC SHALL BE PER ASTM A185 OR A497. USE MATS ONLY, ROLL STOCK IS NOT PERMITTED

3. ALL REINFORCING SHALL HAVE THE MINIMUM COVER PER ACI 318, LATEST EDITION.

4. ALL EXISTING EXPOSED STEEL SHALL BE COATED WITH STEEL CORROSION INHIBITING TREATMENT IN ACCORDANCE WITH SPECIFICATION SECTION 039300

F. MASONRY REPAIR/REPLACEMENT AND REPOINTING

1. REFER TO SPECIFICATION SECTION 040120.63 FOR MASONRY REPAIR/REPLACEMENT REQUIREMENT. CONTRACTOR SHALL NOTIFY ENGINEER IF DETERIORATED WALL TIES, CONCRETE OR OTHER MATERIALS ARE ENCOUNTERED AFTER DEMO IS COMPLETE. INCLUDE NEW GALVANIZED WALL TIES @ 16" O.C. VERTICALLY AND HORIZONTALLY IN MASONRY REPLACEMENT UNIT PRICE.

2. REFER TO SPECIFICATION SECTION 040120.64 FOR MASONRY REPOINTING REQUIREMENT.

3. MEET WITH ENGINEER PRIOR TO STARTING WORK TO AGREE ON EXTENT OF MASONRY REPAIR/REPLACEMENT AND REPOINTING.

G. CONCRETE MASONRY

1. MATERIAL PROPERTIES - MASONRY:

   PRISM STRENGTH OF UNIT MASONRY, f'_m = 1500 psi
   MORTAR TYPE "S" (ABOVE GRADE)

2. MINIMUM VERTICAL REINFORCEMENT FOR MASONRY WALLS SHALL BE #4@48"O.C. TYP. U.N.O. PROVIDE ONE #4 VERTICAL AT ALL CORNERS, AT EACH SIDE OF OPENINGS AND AT ENDS OF WALL. MASONRY WALLS SUBJECT TO VEHICULAR LOADING SHALL BE REINFORCED WITH #4@8" O.C., EXTENDED TO AT LEAST 3'-0" ABOVE FLOOR AND ALL CORES SHALL BE GROUTED SOLID UP TO 3'-0" ABOVE FLOOR.

3. HORIZONTAL JOINT REINFORCEMENT FOR MASONRY WALLS SHALL BE STANDARD WIDTH, GALVANIZED SPACED @ 16" O.C. TYP., U.N.O. PROVIDE ONE-PIECE PREFABRICATED UNITS SPACED @ 8" O.C. AT WALL CORNERS AND INTERSECTIONS

4. PROVIDE CONTROL JOINTS IN MASONRY OF BRICK WALLS AT 20'-0" O.C. MAXIMUM, U.N.O.

5. PAINT NEW MASONRY BLOCKS TO MATCH EXISTING MASONRY BLOCKS IN TEXTURE & COLOR.

H. SEALANT

1. REFER TO SPECIFICATION SECTION 079200 FOR ACCEPTABLE JOINT SEALANTS.

2. REMOVE AND PROPERLY DISPOSE OF EXISTING SEALANT AND APPLY NEW SEALANT TO MATCH EXISTING COLOR. SAMPLES SHALL BE PROVIDED FOR ENGINEER'S & OWNER'S REVIEW AND APPROVAL.

3. JOINT EDGES SHALL BE WATER-BLASTED, SANDBLASTED OR OTHERWISE CLEANED AND PREPARED PRIOR TO THE SEALANT APPLICATION.

4. PRIMER SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS PRIOR TO APPLICATION OF NEW SEALANT.

I. EPOXY INJECTION

1. REFER TO SPECIFICATION SECTION 039300 AND EPOXY INJECTION REPAIR DETAIL 1/R4.1 FOR ADDITIONAL REQUIREMENTS

2. USE APPROPRIATE METHODS AND PLACEMENT OF INJECTION PORTS TO ASSURE COMPLETE COVERAGE OF CRACKS. REVIEW PREPARED CRACK & REPAIR PROCEDURES ON-SITE W/ ENGINEER & OWNER'S INSPECTION AGENCY PRIOR TO INJECTION OF 1ST CRACK.

3. CRACK-REPAIR MATERIALS:

   a. TYPE EI - CRACKS BETWEEN ⅛" & ¼": PRESSURE INJECT CRACKS W/ A HIGH-STRENGTH, VERY-LOW-VISCOSITY STRUCTURAL EPOXY (SIKADUR 35 HI-MOD LV, SIKADUR 52 OR EQUAL). SEAL CRACKS PRIOR TO INJECTION W/ SIKADUR 31 HI-MOD GEL OR EQUAL.

   b. TYPE EW - WET NON-STRUCTURAL WALL CRACKS. INJECT WITH HYDROPHILIC GROUT (SIKAFIX HH HYDROPHILIC, SIKAFIX HH LV OR SIKAFIX HH PLUS). INSTALL PER MANUFACTURER'S REQUIREMENTS

J. TRAFFIC DECK COATING MEMBRANE

1. REFER TO SPECIFICATION SECTION 079020 FOR ACCEPTABLE TRAFFIC DECK COATING MEMBRANE SYSTEMS.

2. PROVIDE SURFACE PREPARATION OF THE EXISTING FLOOR SLABS BY METHODS WHICH CAN BE PERFORMED WITHOUT DAMAGING EXISTING CONCRETE SURFACES.

3. APPLY HEAVY DUTY TRAFFIC DECK COATING TO AREAS SHOWN ON PLAN INCLUDING CURBS AND LANDINGS

4. PREPARATION AND INSTALLATION OF THE TRAFFIC DECK COATING MEMBRANE SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND THE MANUFACTURER'S WRITTEN INSTRUCTIONS. THE FLOOR COVERAGE RATE SPECIFIED IS MINIMUM REQUIREMENT. THE APPLICATION OF THE TRAFFIC DECK COATING MEMBRANE SHALL BE INSPECTED BY MANUFACTURER'S REPRESENTATIVES AND ANY ASSOCIATED COSTS SHALL BE INCLUDED WITHIN THE BID.

K. EXPANSION JOINT SYSTEMS

1. REFER TO SPECIFICATION SECTION 079020 FOR ACCEPTABLE EXPANSION JOINT SYSTEM AND INSTALLATION PROCEDURES.

2. JOINT EDGES AND BLOCKOUTS SHALL BE SANDBLASTED OR PREPARED ACCORDING TO THE MANUFACTURER'S REQUIREMENTS PRIOR TO THE EXPANSION JOINT APPLICATION

L. PENETRATING SEALER

1. REFER TO SPECIFICATION SECTION 079020 FOR ACCEPTABLE PENETRATING SEALERS.

2. PROVIDE SURFACE PREPARATION OF THE FLOOR SLABS BY METHODS WHICH CAN BE PERFORMED WITHOUT DAMAGING EXISTING CONCRETE SURFACES.

3. THE PENETRATING SEALER BE APPLIED IN ACCORDANCE WITH SPECIFICATION SECTION 079020. THE FLOOR COVERAGE RATE SPECIFIED IS MINIMUM REQUIREMENT AND SHALL BE SATISFIED ON A DAY-BY-DAY BASIS. THE APPLICATION OF THE PENETRATING SEALER SHALL BE INSPECTED BY MANUFACTURER'S REPRESENTATIVE AND ANY ASSOCIATED COSTS SHALL BE INCLUDED WITHIN THE BID

M. MECHANICAL/PLUMBING/FIRE PROTECTION SYSTEM & EQUIPMENT

1. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT ALL EXISTING MECHANICAL EQUIPMENT AND SERVICES WITHIN THE FACILITY. IF NECESSARY, REMOVE AND RE-INSTALL AFTER REPAIR IS COMPLETED. CONTRACTOR SHALL REVIEW ALL REPAIR AREAS PRIOR TO SUBMITTING A BID AND INCLUDE THE COST OF REMOVAL AND REPLACEMENT IN THE LUMP SUM BID.

2. SPECIAL CARE SHALL BE TAKEN TO PREVENT CLOGGING EXISTING DRAINS.

3. AFTER WORK IS COMPLETE, CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING ANY EXISTING DRAIN SYSTEMS THAT HAVE BEEN CLOGGED BY CONSTRUCTION ACTIVITIES

4. HIGH-PRESSURE WATER JET CLEAN ALL DRAINAGE PIPES (STORM AND SANITARY) WITHIN THE GARAGE AND EXTENDING 5 FEET PAST THE FACE OF THE GARAGE. REPORT IMPENETRABLE BLOCKAGES, CRACKS, LEAKS, ETC TO THE OWNER AND ENGINEER

N. FLOOR DRAIN INSTALLATION

1. NEW DRAIN(S) AND PIPING SHALL BE INSTALLED IN ACCORDANCE WITH THE DRAWINGS AND THE BUILDING CODE REQUIREMENTS. MAINTAIN THE EXISTING HEADROOM.

O. ELECTRICAL

1. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT ALL EXISTING ELECTRICAL LIGHTS, EMBEDDED CONDUITS, SERVICE AND EQUIPMENT WITHIN THE FACILITY. IF NECESSARY, REMOVE AND RE-INSTALL AFTER REPAIR IS COMPLETED. CONTRACTOR SHALL REVIEW ALL REPAIR AREAS PRIOR TO SUBMITTING A BID AND INCLUDE THE COST OF REMOVAL AND REPLACEMENT IN THE BASE BID

2. EMBEDDED CONDUITS WITHIN REPAIR AREA SHALL BE RE-LOCATED PRIOR TO DEMOLITION.

3. CONSULT AN ELECTRICAL CONTRACTOR PRIOR TO ENGAGING THE RELOCATION OF REPAIR OF ANY ELECTRICAL EQUIPMENT. ELECTRICAL CONTRACTOR IS TO DETERMINE WHETHER ELECTRICAL EQUIPMENT IS LIVE, TRACE WHAT IT SERVICES, AND PROVIDE ADEQUATE SAFETY MEASURES.

P. PAINTING

1. TRAFFIC MARKINGS (STRIPING AND TRAFFIC ARROWS)

   a. CONTRACTOR SHALL REPLACE ALL TRAFFIC MARKINGS (STRIPING AND TRAFFIC ARROWS) THAT ARE WITHIN THE REPAIR WORK. THE CONTRACTOR SHALL DOCUMENT THE EXISTING LAYOUT PRIOR TO CONSTRUCTION, AND AT THE COMPLETION OF REPAIRS PROVIDE THE TRAFFIC MARKINGS TO MATCH SIZE AND LOCATION. REMOVE EXISTING PAINT BY SHOT-BLASTING

Q. ADHESIVE AND EXPANSION ANCHORS / DOWELS

1. EXPANSION ANCHORS SHALL BE HILTI KWIK BOLT TZ OR EQUAL, U.N.O.

2. ADHESIVE ANCHORS SHALL BE HILTI HIT HY 200 OR EQUAL, U.N.O.

3. WHEN INSTALLING ANCHORS IN EXISTING CONCRETE OR MASONRY, EXERCISE CAUTION TO AVOID CUTTING OR DAMAGING THE EXISTING REINFORCING.

4. PREPARATION AND INSTALLATION OF THE ANCHORS / DOWELS SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND THE MANUFACTURER'S WRITTEN INSTRUCTIONS. THE INSTALLATION SHALL BE INSPECTED BY MANUFACTURER'S REPRESENTATIVES AND ANY ASSOCIATED COSTS SHALL BE INCLUDED WITHIN THE BID.

R. EMBEDDED GALVANIC ANODES

1. CONTRACTOR SHALL ONLY ORDER 10% OF REQUIRED ANODES AT BEGINNING OF PROJECT ONCE SUBMITTAL HAS BEEN APPROVED BY ENGINEER. ENGINEER WILL GIVE DIRECTION FOR THE CONTRACTOR TO ORDER ADDITIONAL ANODES AFTER THEIR USE AND NECESSITY HAS BEEN IDENTIFIED DURING THE EARLY STAGES OF THE REPAIR WORK. CONTRACTOR TO INFORM ENGINEER IF A LONG LEAD TIME IS EXPECTED ON THE ANODE ORDERS

S. MEASUREMENT AND RECORD DRAWINGS

1. DO NOT SCALE DRAWINGS. VERIFY ALL DRAWING DIMENSIONS IN THE FIELD.

2. CONTRACTOR SHALL MEASURE AND RECORD THE REPAIR AREAS AND QUANTITIES PERFORMED

3. COPIES OF THE DRAWINGS SHOWING THE ACTUAL SHAPE, LOCATION, AND SIZE OF THE REPAIRS AND A REPAIR TABULATION SPREADSHEET SHALL BE SUBMITTED BY THE CONTRACTOR TO THE ENGINEER AT THE END OF EACH PHASE OF THE PROJECT AND WITH EACH PAYMENT APPLICATION.

4. AT THE PROJECT CONCLUSION, SUBMIT ONE SET OF REPRODUCIBLE RECORD DRAWINGS BY A NEAT AND ORDERLY FASHION TO THE OWNER & ENGINEER SHOWING ALL REPAIRS PERFORMED. PROVIDE ONE HARD COPY AND AN ELECTRONIC COPY IN CAD OR PDF FORMAT

T. PHASING OF WORK

1. BIDDERS SHALL INCLUDE A PRELIMINARY PROPOSED PHASING PLAN WITH THEIR BID. THE CONTRACTOR SHALL BE RESPONSIBLE TO ASSURE THAT THE MAXIMUM NUMBER OF PARKING SPACES DISPLACED AT ANY GIVEN TIME DURING CONSTRUCTION DOES NOT EXCEED 40 STALLS, U.N.O.

2. THE SUCCESSFUL CONTRACTOR SHALL SUBMIT ITS PROPOSED PHASING PLAN FOR APPROVAL. THE CONTRACTOR SHALL COORDINATE CLOSELY WITH THE ENGINEER AND THE OWNER WHILE DEVELOPING, MAINTAINING, AND REVISING THE PHASING PLAN AS REQUIRED.

3. THE INTENT OF THE CONTRACTOR'S PHASING PLAN SHOULD BE TO DIVIDE THE WORK INTO THE LEAST NUMBER OF PHASES WHILE MAINTAINING VEHICLE ACCESSIBILITY TO ALL AREAS THAT ARE NOT BEING WORKED ON. RAMPS ARE ASSUMED TO BE ABLE TO BE SPLIT INTO TWO PHASES. FLAGMEN SHALL BE PROVIDED AS REQUIRED BASED ON THE CONTRACTOR'S APPROVED PHASING PLAN

4. WORK AT RAMPS AND OTHER HIGH-VOLUME AREAS IS TO BE COMPLETED ON WEEKENDS. WORK AT ENTRY AND EXIT LANES SHALL BE PERFORMED ON WEEKENDS. ALL OTHER WORK CAN BE COMPLETED EITHER DURING THE DAY OR AT NIGHT, UNLESS NOTED OTHERWISE BY THE OWNER OR GARAGE OPERATOR OR BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION. COMPLY WITH WORK HOUR RESTRICTIONS AND NOISE ORDINANCE OF THE AUTHORITY HAVING JURISDICTION

5. THE CONTRACTOR SHOULD COORDINATE THE SHUTDOWN OF AREAS FOR THE APPLICATION OF WATERPROOFING MATERIALS WITH THE EXTENDED WEATHER FORECAST TO AVOID WEATHER-RELATED DELAYS.

6. PARKING BELOW DEMOLITION WORK AND/OR STRUCTURAL REPAIRS SHALL BE TAKEN OUT OF SERVICE UNTIL REPAIRS ARE COMPLETED.

7. REFER TO SPECIFICATION SECTION 011000 SUMMARY FOR ADDITIONAL REQUIREMENTS AND RESTRICTIONS

U. EXAMINATION PRIOR TO CUTTING, DRILLING, AND CORING THROUGH STRUCTURE

A. DO NOT CUT, DRILL OR CORE THROUGH ANY STRUCTURAL ELEMENT WITHOUT PRIOR WRITTEN APPROVAL FROM THE ENGINEER, U.N.O.

B. THE CONTRACTOR SHALL SCAN THE CONCRETE AT ALL LOCATIONS OF PROPOSED CUTS AND PENETRATIONS TO LOCATE AND MARK ALL EMBEDDED OBJECTS INCLUDING BUT NOT LIMITED TO REINFORCING, PRESTRESS OR POST-TENSION STRANDS, CONNECTIONS, ELECTRICAL CONDUIT, AND ANY OTHER HARDWARE/EQUIPMENT. SCANNING SHALL BE PERFORMED BY A CERTIFIED TECHNICIAN USING A PACHOMETER OR GROUND PENETRATING RADAR (GPR) TYPE SCANNER. CALIBRATE THE SCANNER AT THE BEGINNING OF EACH SHIFT AND WHEN CONDITIONS CHANGE. LOCATE AT LEAST THREE REINFORCING BARS USING THE SCANNER, AND MARKER DRILL TEST HOLES TO DETERMINE DEPTH OF COVER. CALIBRATE SCANNER USING THE DEPTH OF COVER MEASUREMENTS.

C. ADJUST LOCATIONS OF CUTS AND PENETRATIONS AS REQUIRED TO AVOID EMBEDDED OBJECTS

D. SUBMIT SCANNING REPORT(S), INCLUDING PHOTOGRAPHS AND SCALED DRAWINGS AND/OR SKETCHES, TO ARCHITECT/ENGINEER FOR APPROVAL. ALLOW SEVEN DAYS FOR ARCHITECT/ENGINEER TO REVIEW AND APPROVE OR COMMENTS ON THE PROPOSED CUTS AND PENETRATIONS. ADJUST THE LOCATIONS AS DIRECTED BY THE ARCHITECT/ENGINEER.

E. USE HAMMER DRILLS WHEN POSSIBLE. DO NOT CORE DRILL UNLESS THE SCANNING OPERATION HAS CLEARLY SHOWN THAT THE AREA IS FREE OF EMBEDDED OBJECTS.

F. DO NOT CUT THROUGH OR DAMAGE THE EMBEDDED OBJECTS INCLUDING BUT NOT LIMITED TO REINFORCING, PRESTRESS OR POST-TENSION STRANDS, CONNECTIONS, ELECTRICAL CONDUIT, AND ANY OTHER HARDWARE/EQUIPMENT.

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PROFESSIONAL SEAL

CONSULTANT

PROJECT NO.
NBR19122.00

PROJECT

GREENWICH TOWN HALL PARKING GARAGE

2019 RESTORATION

GREENWICH, CT

SUBMISSIONS / REVISIONS

NO.	DESCRIPTION	DATE

DRAWN: DC
REVIEWED: JCR
DATE: 09/27/2019

SHEET TITLE:
GENERAL NOTES

SHEET NO.
R0.1

RFB #7527

EXHIBIT I

ABBREVIATIONS

[illegible]	[illegible]
A.F.F.	ABOVE FINISHED FLOOR
ALT.	ALTERNATE
ARCH	ARCHITECT
BET.	BETWEEN
BIT.	BITUMINOUS
BOTT.	BOTTOM
BRG.	BEARING
C.I.P.	CAST-IN-PLACE
C.J	CONTROL JOINT/ CONSTRUCTION JOINT
CL./CLR.	CLEAR
C.M	CONSTRUCTION MANAGER
C.M.U.	CONCRETE MASONRY UNIT
COL.	COLUMN
CONC.	CONCRETE
CONN.	CONNECTION
CONT.	CONTINUOUS
CONTR.	CONTRACTOR
D.B.A.	DEFORMED BAR ANCHOR
DET.	DETAIL
DIA.	DIAMETER
DIM	DIMENSION
DN.	DOWN
DWG(S).	DRAWING(S)
(E)	EXISTING
EA	EACH
E.B.F.	ELEVATION BOTTOM OF FOOTING
E.B.P.	ELEVATION BOTTOM OF PIER
E.F	EACH FACE
E.F.G.	ELEVATION FINISHED GRADE
E.J	EXPANSION JOINT
EL./ELEV.	ELEVATION
ELEC.	ELECTRICAL
EOS	EDGE OF SLAB
E.T.B	ELEVATION TOP OF BEAM
E.T.C.	ELEVATION TOP OF PILE OR DRILLED PIER CAP
E.T.F	ELEVATION TOP OF FOOTING
E.T.L.	ELEVATION TOP OF LEDGE
E.T.P.	ELEVATION TOP OF PIER
E.T.P/C.	ELEVATION TOP OF PRECAST
E.T.S.	ELEVATION TOP OF SLAB
E.T.W.	ELEVATION TOP OF WALL
E.W.	EACH WAY
E.W.E.F.	EACH WAY, EACH FACE
E.W.P.	ELEVATION WORKING POINT
EXT.	EXTERIOR
F.D.	FLOOR DRAIN
F.E.	FIRE EXTINGUISHER
F.F.	FAR FACE
FDN.	FOUNDATION
FIN.	FINISH
FL./FLR.	FLOOR
FTG.	FOOTING
GA.	GAUGE
GALV.	GALVANIZED
G.B.	GRADE BEAM
G.C.	GENERAL CONTRACTOR
GR	GRADE
G.W.B	GYPSUM WALL BOARD
H.A.S.	HEADED ANCHOR STUDS
H.M	HOLLOW METAL
HOR.	HORIZONTAL
HT.	HEIGHT
H.V.A.C.	HEATING, VENTILATION & AIR CONDITIONING
I.D.	INSIDE DIAMETER
INFO.	INFORMATION
INSUL.	INSULATION
INT.	INTERIOR
INV	INVERT
JT.	JOINT
LBS.	POUNDS
LIN.	LINEAL
MAX.	MAXIMUM
MECH.	MECHANICAL
MFR.	MANUFACTURER
MIN	MINIMUM
MISC	MISCELLANEOUS
MSB	MEDIUM SAND BLAST
MTL.	METAL
(N)	NEW
N.F.	NEAR FACE
N.I.C.	NOT IN CONTRACT
N.S.N.S.	NON-SHRINK, NON-STAIN
N.T.S.	NOT TO SCALE
O.C., O/C	ON CENTERS
O.D.	OUTSIDE DIAMETER
O.H.	OPPOSITE HAND
P/C	PRECAST CONCRETE
PSI	POUNDS PER SQUARE INCH
PSF	POUNDS PER SQUARE FOOT
P/T	POST-TENSIONED
R.D.	ROOF DRAIN
REINF.	REINFORCEMENT/REINFORCING
REQ'D	REQUIRED
RM.	ROOM
R.O.	ROUGH OPENING
SCHED.	SCHEDULE
SECT.	SECTION
SHT.	SHEET
SIM.	SIMILAR
S.O.G.	SLAB-ON-GRADE
SPECS	SPECIFICATIONS
SQ	SQUARE
STD.	STANDARD
STL.	STEEL
T & B	TOP AND BOTTOM
T.B.D.	TO BE DETERMINED
TYP.	TYPICAL
U.N.	UNLESS NOTED
VERT.	VERTICAL
V.I.F.	VERIFY IN FIELD
W/	WITH
W/O	WITHOUT
W.P.	WORKING POINT
WT.	WEIGHT
WWF	WELDED WIRE FABRIC
WWR	WELDED WIRE REINFORCEMENT

LEGEND

FLOOR REPAIR

REPAIR TYPE OF REFERENCE — (XX-X) (#) — # OF LOCATIONS PER REFERENCE — QUANTITY

OVERHEAD REPAIR

REPAIR TYPE OF REFERENCE — [XX - X] (#) — # OF LOCATIONS PER REFERENCE — QUANTITY

VERTICAL REPAIR

REPAIR TYPE OF REFERENCE — ◇XX-X◇ (#) — # OF LOCATIONS PER REFERENCE — QUANTITY

REPAIR AREAS ON PLAN ARE DEPICTED ON THE FOLLOWING SURFACES:

PLAN — OVERHEAD FLOOR

- PARTIAL DEPTH FLOOR REPAIR OR CURB REPAIR
- OVERHEAD FLOOR REPAIR
- FULL DEPTH FLOOR REPAIR
- CONCRETE OVERLAY REPAIR
- TRAFFIC DECK MEMBRANE REPAIR OR REPLACEMENT
- STATIC FLOOR CRACK REPAIR

FLOOR REPAIR

PFR	PARTIAL DEPTH FLOOR REPAIR
CRB	CURB REPAIR
EJ	EXPANSION JOINT REPLACEMENT
PTR	POST TENSION REPAIR
FCS	STATIC FLOOR CRACK REPAIR
SFR	SHALLOW DEPTH FLOOR REPAIR
FFR	FULL DEPTH FLOOR REPAIR
ATR	ADDITIONAL TOPPING TO RE-SLOPE
RAR	RE-LEVEL ACCESSIBLE ROUTE
SR	SEALANT REPLACEMENT
TCR	TRAFFIC DECK COATING REMOVAL
TCA	TRAFFIC DECK COATING APPLICATION-URETHANE
PMR	PAVEMENT MARKING RE-PAINTING
SFD	SUPPLEMENTAL FLOOR DRAIN
RFD	FLOOR DRAIN REPLACENT

OVERHEAD REPAIR

EI	EPOXY INJECTION
OSR	OVERHEAD SURFACE REPAIR
OBR	OVERHEAD BEAM REPAIR

VERTICAL REPAIR

VR	VERTICAL REPAIR
VRE	VERTICAL REPAIR EXTERIOR
VSR	VERTICAL SEALANT REPAIR
EIW	WET PROXY INJECTION
BRP	BRICK REPOINTING (STD. SIZE)
BR	BRICK REPLACEMENT
ESR	EDGE OF SLAB REPAIR WITH STRESSING COUPLER
ERS1	EDGE OF SLAB REPAIR WITH STRESSING ANCHORAGE
ESR2	P/T TENDON STRESSING COUPLER REPAIR
ESR3	P/T STRESSING ANCHORAGE REPAIR
CR	COLUMN REPAIR
STR	STAIR REPLACEMENT
GRI	GUARDRAIL INSTALLATION @ ADA SPACES
RS	REPLACE SIGNAGE-ADA SPACES
SRR	STAIR RAILING REPLACEMENT
PR	PIPE REPLACEMENT
CW	COLUMN WATERPROOFING
BCR	BARRIER CABLE REPLACEMENT
CRE	COLUMN REPAIR WITH ENLARGEMENT
VBR	VEHICULAR BARRIER REPLACEMENT
ILF	INTERIOR LIGHT FIXTURES
ELF	EXTERIOR POLE LIGHT FIXTURES

SCOPE OF WORK AND BIDDING QUANTITIES

THE FOLLOWING INFORMATION SHALL BE USED BY THE BIDDER FOR ASSISTANCE IN PREPARING THE BID. THE ITEMS NOTED AS UNIT PRICE WORK SHALL BE BID IN ACCORDANCE WITH THE QUANTITIES SHOWN FOR THE BASE BID. THE CONTRACT PRICE WILL BE ADJUSTED TO REFLECT THE ACTUAL QUANTITY OF WORK PERFORMED. THE UNIT PRICES WILL BE USED TO INCREASE OR DECREASE THE CONTRACT SUM.

THE REPAIR AREAS INDICATED ON THE DRAWINGS ARE A GENERAL INDICATION OF WHERE THE ENGINEER'S SURVEYS HAVE NOTED POSSIBLE REPAIR LOCATIONS. THE CONTRACTOR SHALL NOT MAKE ANY ASSUMPTIONS OF REPAIR LOCATIONS, SIZES, OR OVERALL QUANTITIES BASED UPON THE INFORMATION ON PLANS. THE PROCEDURE FOR DETERMINING THE REPAIR LOCATIONS ARE EXPLAINED IN THE GENERAL NOTES AND SPECIFICATIONS. ALL WORK SHALL BE PERFORMED BASED ON THE GENERAL CONDITIONS SET FORTH IN THE PROJECT SPECIFICATIONS.

* THE CONTINGENT REPAIR QUANTITIES ARE INCLUDED IN THE TOTAL BASE BID QUANTITY. THE EXACT LOCATION AND QUANTITIES OF REPAIRS SHALL BE FIELD VERIFIED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. CONTRACTOR SHALL ONLY ORDER 10% OF REQUIRED MATERIALS AT BEGINNING OF PROJECT ONCE SUBMITTAL HAS BEEN APPROVED BY ENGINEER. CONTRACTOR SHALL ORDER ADDITIONAL MATERIALS AFTER THEIR USE AND NECESSITY HAS BEEN IDENTIFIED DURING THE EARLY STAGES OF THE REPAIR WORK. CONTRACTOR TO INFORM THE ENGINEER/OWNER IF A LONG LEAD TIME IS EXPECTED ON THE MATERIAL ORDERS.

REPAIR ITEMS		UNIT OF MEASURE	TOTAL BASE BID QUANTITIES	PHASE I	PHASE II	PHASE III	REPAIR REFERENCE	UNIT PRICE NUMBER	NOTES
PFR	PARTIAL DEPTH FLOOR REPAIR	SF	1921	1058	863	-	1/R4.1	1	
SFR	SHALLOW DEPTH FLOOR REPAIR	SF	15	6	9	-	4/R4.2	2	
FFR	FULL DEPTH FLOOR REPAIR*	SF	150	100	50	-	5/R4.2	3	
OSR	OVERHEAD SURFACE REPAIR	SF	679	30	649	-	2/R4.2	4	
OBR	OVERHEAD BEAM REPAIR	SF	156	15	141	-	3/R4.2	5	
VR	VERTICAL REPAIR	SF	126	9	75	42	2/R4.1	6	
VRE	VERTICAL REPAIR-EXTERIOR	LF	143	143	-	-	2/R4.1, SIM & 1/R4.4	7	
CR	COLUMN REPAIR	SF	122	-	122	-	7/R4.2	8	
CRB	CURB REPAIR	SF	10	10	-	-	3/R4.2	9	
FCS	STATIC FLOOR CRACK REPAIR	LF	50	-	50	-	6/R4.2	10	
EI	EPOXY INJECTION	LF	465	-	-	465	4/R4.1	11	
EIW	WET EPOXY INJECTION	LF	155	-	-	155	4/R4.1	12	-
SR	SEALANT REPLACEMENT	LF	15		-	15	6/R4.1	13	
TCR	TRAFFIC DECK COATING REMOVAL	SF	32984	32984	-	-	5/R4.1	14	
TCA	TRAFFIC DECK COATING APPLICATION	SF	32984	-	32984	-	5/R4.1	15	
EJ	EXPANSION JOINT REPLACEMENT	LF	31	-	31	-	6/R4.1	16	
VSR	VERTICAL SEALANT REPLACEMENT	LF	180	-	-	180	1/R4.2	17	
SFD	SUPPLEMENTAL FLOOR DRAIN	EA	2	-	2	-	7/R4.1	18	
RFD	REPLACEMENT FLOOR DRAIN	EA	1	-	1	-	7/R4.2	19	
PTR	P/T TENDON SPLICE REPAIR	EA	95	50	45	-	2/R4.3	20	
BRP	BRICK REPOINTING	SF	624	624	-	-	1 & 9/R4.2	21	
BR	BRICK REPLACEMENT	EA	24	24	-	-	1 & 10/R4.2	22	
ESR	EDGE OF SLAB REPAIR WITH P/T STRESSING COUPLER	LF	64	64	-	-	1/R4.4	23	
ESR1	EDGE OF SLAB WITH P/T STRESSING ANCHORAGE REPAIR	LF	-	-	-	-	1/R4.4	24	SEE P/T GEN. NOTE 3 ON R4.4
ESR2	P/T TENDON WITH STRESSING COUPLER REPAIR	LF	-	-	-	-	1/R4.4	25	SEE P/T GEN. NOTE 3 ON R4.4
ESR3	P/T TENDON WITH STRESSING ANCHORAGE REPAIR	LF	-	-	-	-	1/R4.4	26	SEE P/T GEN. NOTE 3 ON R4.4
STR	STAIR REPLACEMENT	EA	3	-	-	3	3/R4.3	27	
CW	COLUMN WATERPROOFING	SF	6029	-	-	6029		28	APPLY SIKAGARD 550W PER MANUFACTURER'S WRITTEN INSTRUCTIONS @ ALL SIDES OF COLUMNS
ATR	ADDITIONAL TOPPING TO RE-SLOPE	SF	5760	-	5760	-	11/R4.2	29	
RAR	RE-LEVEL ACCESSIBLE ROUTE	LS	1	-		-	12/R4.2	30	
GRI	GUARDRAIL INSTALLATION @ ADA SP.	LF	50	-	50	-	8/R4.2	31	
RS	REPLACE SIGNAGE-ADA SPACES	EA	6	-	6	-	1/R4.3	32	
SRR	STAIR RAILING REPLACEMENT	EA	3	-	-	3	2/R4.3	33	
PR	PIPE REPLACEMENT	LF	100	-	-	100		34	4"ø CAST-IRON PIPE
PMR	PAVEMENT MARKING RE-PAINTING	LS	1	-	-	1		35	RE-PAINT TO MATCH EXISTING
BCR	BARRIER CABLE REPLACEMENT	EA	4	-	-	4	5/R4.3	36	
CRE	COLUMN REPAIR WITH ENLARGEMENT	SF	48	-	48	-	4/R4.3	37	
VBR	VEHICULAR BARRIER REPLACEMENT	EA	1	-	-	1		38	REPLACE TO MATCH EXISTING
LSW	LUMP SUM WORK ITEMS	EA	1	-	-	1		39	SEE LUMP SUM WORK ITEMS ON SHEET R0.2
ILF	INTERIOR LIGHT FIXTURES	EA	34	-	-	34		40	SEE LIGHTING NOTES ON R0.2
ELF	EXTERIOR POLE LIGHT FIXTURE	EA	6	-	-	6		41	SEE LIGHTING NOTES ON R0.2

SCOPE OF WORK TABLE NOTES

1. REPAIR QUANTITIES IN THE BASE BID TABLE HAVE INCLUDED THE CONTINGENCIES FOR SOME REPAIR ITEMS AND FINAL REPAIR QUANTITIES SHALL BE FIELD VERIFIED AND APPROVED BY THE ENGINEER.
2. INCLUDE COST OF GALVANIC ANODES IN UNIT PRICES OF REPAIR TYPES "PFR", "SFR" AND "FFR", TYP.
3. TRAFFIC DECK COATING-URETHANE: REMOVE EXISTING DELAMINATED TRAFFIC DECK COATING AND INSTALL NEW TRAFFIC DECK COATING-URETHANE SYSTEM. THE PROPER SURFACE PREPARATION SHALL BE PERFORMED PRIOR TO INSTALLATION OF URETHANE TRAFFIC BEARING MEMBRANE SYSTEM.

LUMP SUM WORK ITEMS

1. GENERAL CONDITIONS (REFER TO PROJECT SPECIFICATIONS.)
2. CLEAN ALL EXPANSION JOINT SEALS AND REMOVE DEBRIS, DUST, SAND, ETC. FROM CORRUGATED GAPS IN EXPANSION JOINT CELLS.
3. CLEAN THE ENTIRE DRAINAGE SYSTEM (DRAINS AND PIPING) WITHIN THE GARAGE FOOTPRINT.
4. RETENSION ALL LOOSE BARRIER CABLES.
5. INCLUDE 50 LF OF ELECTRICAL CONDUIT AND WIRING FOR INTERIOR AND EXTERIOR LIGHT FIXTURE INSTALLATION.

LIGHTING NOTES

1. OWNER SHALL PROVIDE ALL LIGHTING FIXTURE, AND CONTRACTOR WILL INSTALL THEM AT LOCATIONS PROVIDED BY OWNER.
2. IG-JBNT MOUNTS WITH IG-NM-5S-A-40K-UL-WT LUMINAIRE ARE TO BE INSTALLED ON THE MIDDLE AND LOWER LEVEL OF THE GARAGE, AND IVA14-130LPA740ZU OUTSIDE POLE LIGHT FIXTURES ARE TO BE INSTALLED ON THE TOP LEVEL.

TimHaahs

PROFESSIONAL SEAL

CONSULTANT

PROJECT NO.
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PROJECT

GREENWICH TOWN HALL PARKING GARAGE

2019 RESTORATION

GREENWICH, CT

SUBMISSIONS / REVISIONS

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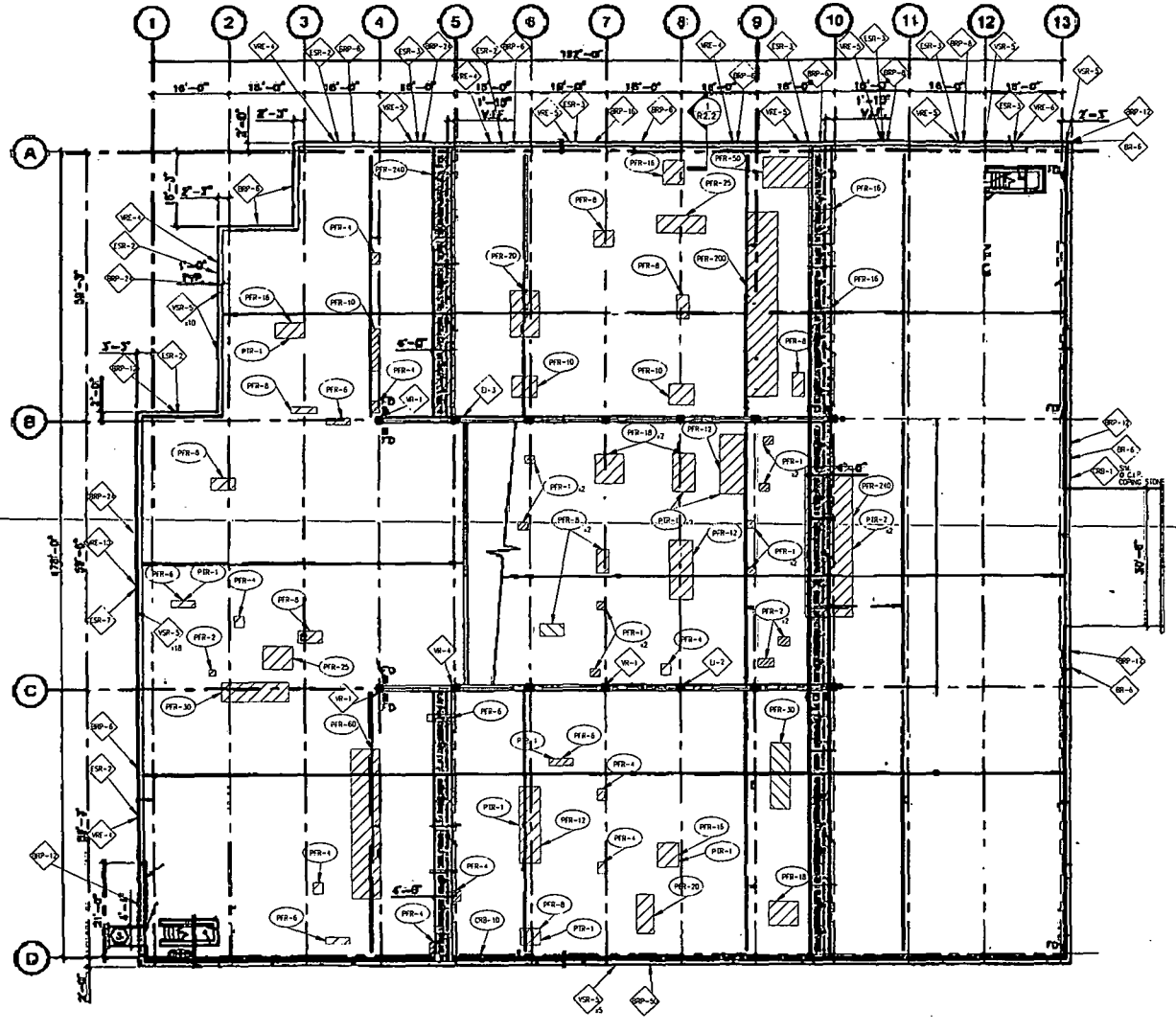
SHEET TITLE:
SCOPE OF WORK

SHEET NO.
R0.2

RFB #7527
EXHIBIT I



1 / R1.1 TOP LEVEL PLAN (PHASE I)
N.T.S

LEGEND

FLOOR REPAIR

REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE — QUANTITY

OVERHEAD REPAIR

REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE — QUANTITY

VERTICAL REPAIR

REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE — QUANTITY

REPAIR AREAS ON PLAN ARE DEPICTED ON THE FOLLOWING SURFACES.

PLAN — OVERHEAD FLOOR

- PARTIAL DEPTH FLOOR REPAIR OR CURB REPAIR
- OVERHEAD FLOOR REPAIR
- FULL DEPTH FLOOR REPAIR
- CONCRETE OVERLAY REPAIR
- TRAFFIC DECK MEMBRANE REPAIR OR REPLACEMENT
- STATIC FLOOR CRACK REPAIR

FLOOR REPAIR

PFR	PARTIAL DEPTH FLOOR REPAIR
CRB	CURB REPAIR
EJ	EXPANSION JOINT REPLACEMENT
PTR	POST TENSION REPAIR
FCS	STATIC FLOOR CRACK REPAIR
SFR	SHALLOW DEPTH FLOOR REPAIR
FFR	FULL DEPTH FLOOR REPAIR
ATR	ADDITIONAL TOPPING TO RE-SLOPE
RAR	RE-LEVEL ACCESSIBLE ROUTE
SR	SEALANT REPLACEMENT
TCR	TRAFFIC DECK COATING REMOVAL
TCA	TRAFFIC DECK COATING APPLICATION-URETHANE
PMR	PAVEMENT MARKING RE-PAINTING
SFD	SUPPLEMENTAL FLOOR DRAIN
RFD	FLOOR DRAIN REPLACENT

OVERHEAD REPAIR

EI	EPOXY INJECTION
OSR	OVERHEAD SURFACE REPAIR
OBR	OVERHEAD BEAM REPAIR

VERTICAL REPAIR

VR	VERTICAL REPAIR
VRE	VERTICAL REPAIR EXTERIOR
VSR	VERTICAL SEALANT REPAIR
EW	WET EPOXY INJECTION
BRP	BRICK REPOINTING (STD. SIZE)
BR	BRICK REPLACEMENT
ESR	EDGE OF SLAB REPAIR WITH STRESSING COUPLER
ESR1	EDGE OF SLAB REPAIR WITH STRESSING ANCHORAGE
ESR2	PIT TENDON STRESSING COUPLER REPAIR
ESR3	PIT STRESSING ANCHORAGE REPAIR
CR	COLUMN REPAIR
STR	STAIR REPLACEMENT
GRI	GUARDRAIL INSTALLATION @ ADA SPACES
RS	REPLACE SIGNAGE-ADA SPACES
SRR	STAIR RAILING REPLACEMENT
PR	PIPE REPLACEMENT
CW	COLUMN WATERPROOFING
BCR	BARRIER CABLE REPLACEMENT
CRE	COLUMN REPAIR WITH ENLARGEMENT
VBR	VEHICULAR BARRIER REPLACEMENT
ILF	INTERIOR LIGHT FIXTURES
ELF	EXTERIOR POLE LIGHT FIXTURES

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GREENWICH, CT

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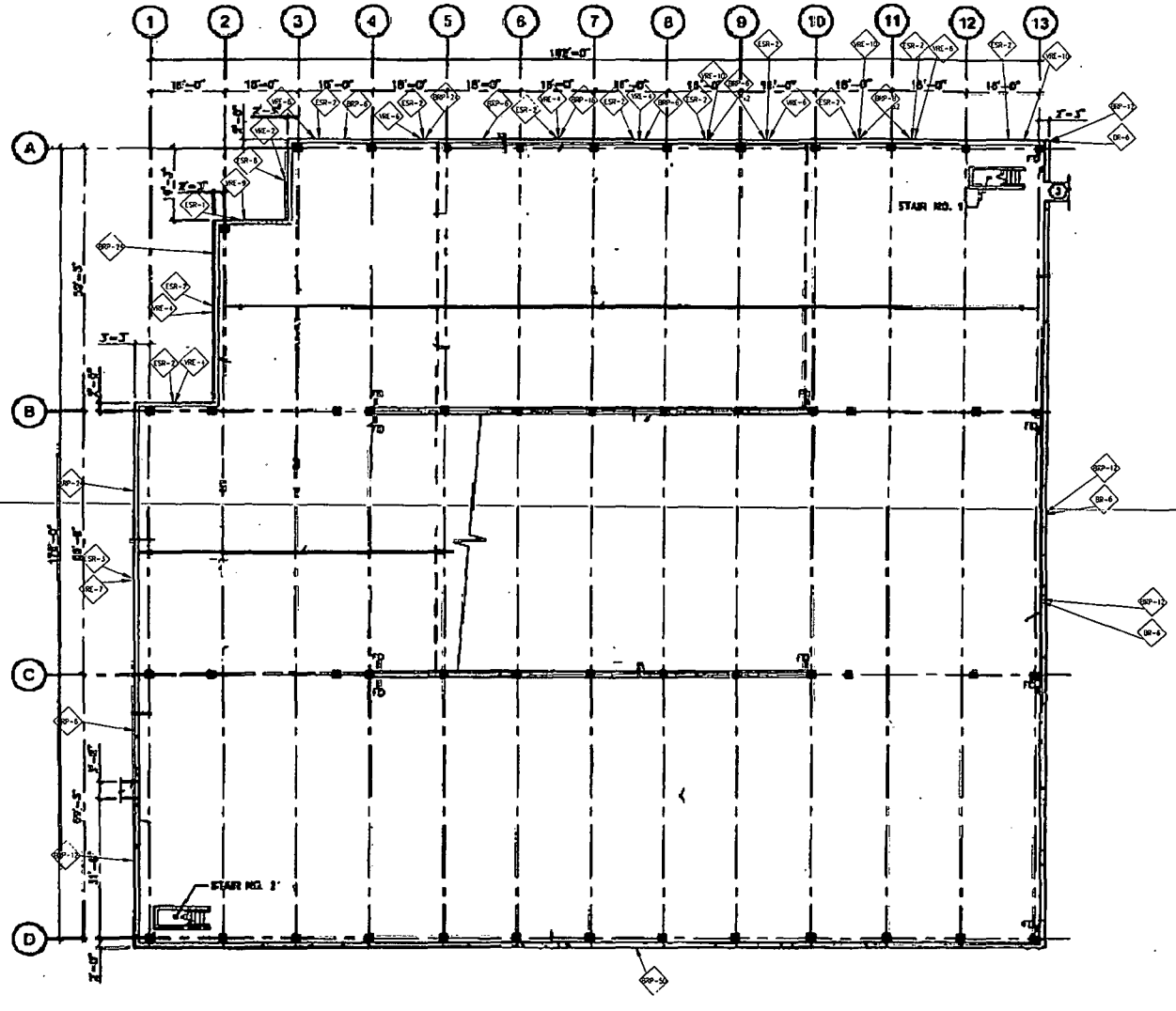
SHEET TITLE:
PHASE I TOP LEVEL RESTORATION PLAN

SHEET NO.
R1.1

RFB #7527

EXHIBIT I



1 / R1.2 MIDDLE LEVEL PLAN (PHASE I)
N.T.S

LEGEND

FLOOR REPAIR
REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE (#) — QUANTITY

OVERHEAD REPAIR
REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE (#) — QUANTITY

VERTICAL REPAIR
REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE (#) — QUANTITY

REPAIR AREAS ON PLAN ARE DEPICTED ON THE FOLLOWING SURFACES:

PLAN / OVERHEAD FLOOR

- PARTIAL DEPTH FLOOR REPAIR OR CURB REPAIR
- OVERHEAD FLOOR REPAIR
- FULL DEPTH FLOOR REPAIR
- CONCRETE OVERLAY REPAIR
- TRAFFIC DECK MEMBRANE REPAIR OR REPLACEMENT
- STATIC FLOOR CRACK REPAIR

FLOOR REPAIR

PFR	PARTIAL DEPTH FLOOR REPAIR
CRB	CURB REPAIR
EJ	EXPANSION JOINT REPLACEMENT
PTR	POST TENSION REPAIR
FCR	STATIC FLOOR CRACK REPAIR
SFR	SHALLOW DEPTH FLOOR REPAIR
FFR	FULL DEPTH FLOOR REPAIR
ATR	ADDITIONAL TOPPING TO RE-SLOPE
RAR	RE-LEVEL ACCESSIBLE ROUTE
SR	SEALANT REPLACEMENT
TDR	TRAFFIC DECK COATING REMOVAL
TCA	TRAFFIC DECK COATING APPLICATION/URETHANE
PMR	PAVEMENT MARKING RE-PAINTING
SFD	SUPPLEMENTAL FLOOR DRAIN
RFD	FLOOR DRAIN REPLACEMT

OVERHEAD REPAIR

EI	EPOXY INJECTION
OSR	OVERHEAD SURFACE REPAIR
OBR	OVERHEAD BEAM REPAIR

VERTICAL REPAIR

VR	VERTICAL REPAIR
VRE	VERTICAL REPAIR EXTERIOR
VSR	VERTICAL SEALANT REPAIR
EAV	VAST PROXY INJECTION
BRP	BRICK REPOINTING (STD. SIZE)
BR	BRICK REPLACEMENT
ESR	EDGE OF SLAB REPAIR WITH STRESSING COUPLER
ERS1	EDGE OF SLAB REPAIR WITH STRESSING ANCHORAGE
ESR2	PIT TENDON STRESSING COUPLER REPAIR
ESR3	PIT STRESSING ANCHORAGE REPAIR
CR	COLUMN REPAIR
STR	STAIR REPLACEMENT
GRI	GUARDRAIL INSTALLATION @ ADA SPACES
RS	REPLACE SIGNAGE-ADA SPACES
SRR	STAIR RAILING REPLACEMENT
PR	PIPE REPLACEMENT
CW	COLUMN WATERPROOFING
BCR	BARRIER CABLE REPLACEMENT
CRE	COLUMN REPAIR WITH ENLARGEMENT
VBR	VEHICULAR BARRIER REPLACEMENT
ILF	INTERIOR LIGHT FIXTURES
ELF	EXTERIOR POLE LIGHT FIXTURES

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PHASE I MIDDLE LEVEL RESTORATION PLAN

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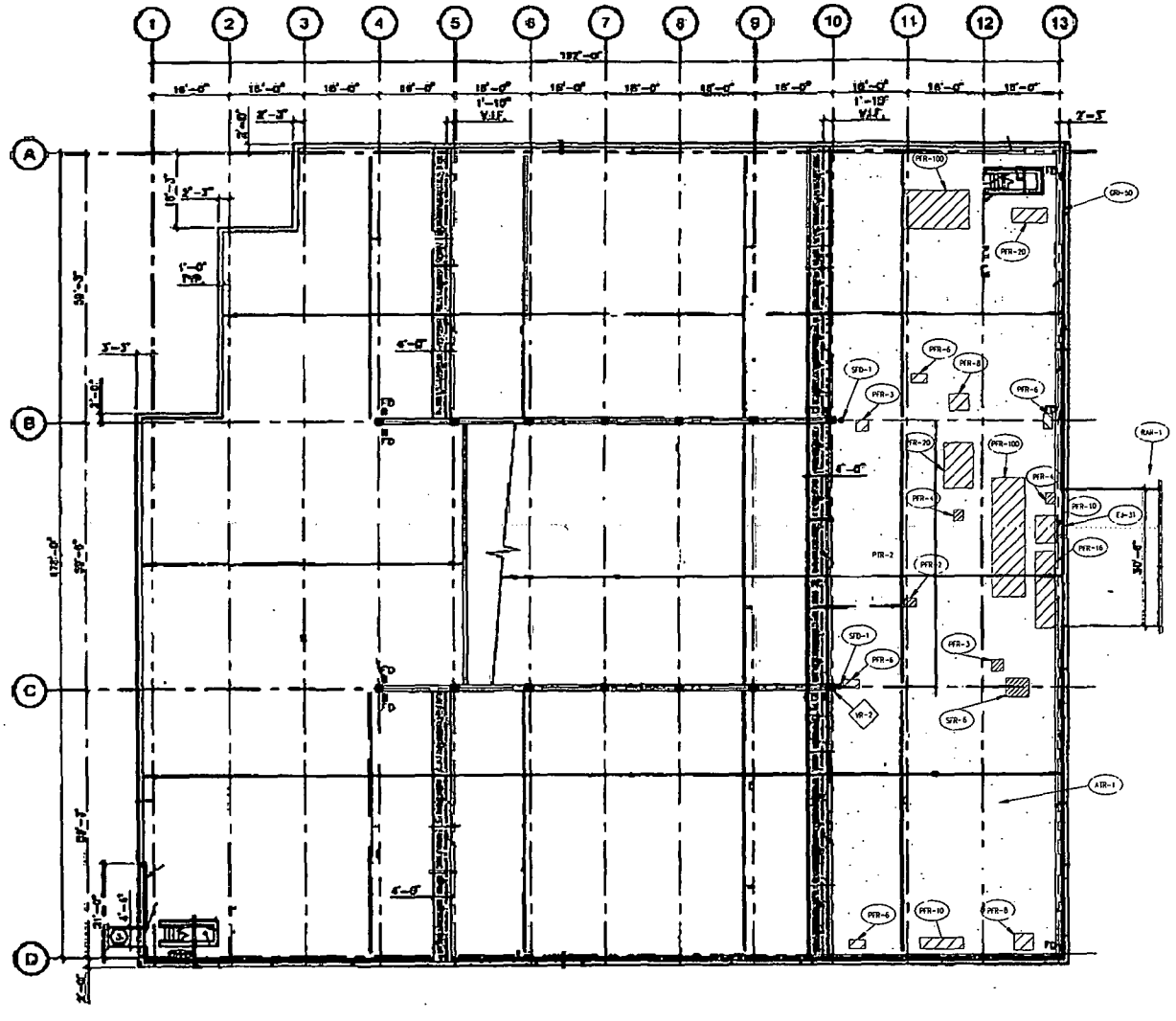
R1.2

RFB #7527

EXHIBIT I



1/R2.1 TOP LEVEL PLAN (PHASE II)
N.T.S

LEGEND

FLOOR REPAIR
REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE — QUANTITY

OVERHEAD REPAIR
REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE — QUANTITY

VERTICAL REPAIR
REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE — QUANTITY

REPAIR AREAS ON PLAN ARE DEPICTED ON THE FOLLOWING SURFACES:
PLAN X OVERHEAD FLOOR

- PARTIAL DEPTH FLOOR REPAIR OR CURB REPAIR
- OVERHEAD FLOOR REPAIR
- FULL DEPTH FLOOR REPAIR
- CONCRETE OVERLAY REPAIR
- TRAFFIC DECK MEMBRANE REPAIR OR REPLACEMENT
- STATIC FLOOR CRACK REPAIR

FLOOR REPAIR
- PFR PARTIAL DEPTH FLOOR REPAIR
- CRB CURB REPAIR
- EJ EXPANSION JOINT REPLACEMENT
- PTR POST TENSION REPAIR
- FCR STATIC FLOOR CRACK REPAIR
- SFR SHALLOW DEPTH FLOOR REPAIR
- FFR FULL DEPTH FLOOR REPAIR
- ATR ADDITIONAL TOPPING TO RE-SLOPE
- RAM RE-LEVEL ACCESSIBLE ROUTE
- SR SEALANT REPLACEMENT
- TCR TRAFFIC DECK COATING REMOVAL
- TCA TRAFFIC DECK COATING APPLICATION-URETHANE
- PMR PAVEMENT MARKING RE-PAINTING
- SFD SUPPLEMENTAL FLOOR DRAIN
- RFD FLOOR DRAIN REPLACENT

OVERHEAD REPAIR
- EI EPOXY INJECTION
- OSR OVERHEAD SURFACE REPAIR
- OBR OVERHEAD BEAM REPAIR

VERTICAL REPAIR
- VR VERTICAL REPAIR
- VRE VERTICAL REPAIR EXTERIOR
- VSR VERTICAL SEALANT REPAIR
- CMI WET PROLY INJECTION
- BRP BRICA REPOINTING (STD. &CE)
- BR BRICA REPLACEMENT
- ESR EDGE OF SLAB REPAIR WITH STRESSING COUPLER
- ESR1 EDGE OF SLAB REPAIR WITH STRESSING ANCHORAGE
- ESR2 PIT TENDON STRESSING COUPLER REPAIR
- ESR3 PIT STRESSING ANCHORAGE REPAIR
- CR COLUMN REPAIR
- STR STAIR REPLACEMENT
- GRI GUARDRAIL INSTALLATION @ ADA SPACES
- RS REPLACE SIGNAGE-ADA SPACES
- SRR STAIR RAILING REPLACEMENT
- PR PIPE REPLACEMENT
- CW COLUMN WATERPROOFING
- BCR BARRIER CABLE REPLACEMENT
- CRE COLUMN REPAIR WITH ENLARGEMENT
- VBR VEHICULAR BARRIER REPLACEMENT
- ILF INTERIOR LIGHT FIXTURES
- ELF EXTERIOR POLE LIGHT FIXTURES

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PROJECT
GREENWICH TOWN HALL PARKING GARAGE

2019 RESTORATION

GREENWICH, CT

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NO.	DESCRIPTION	DATE

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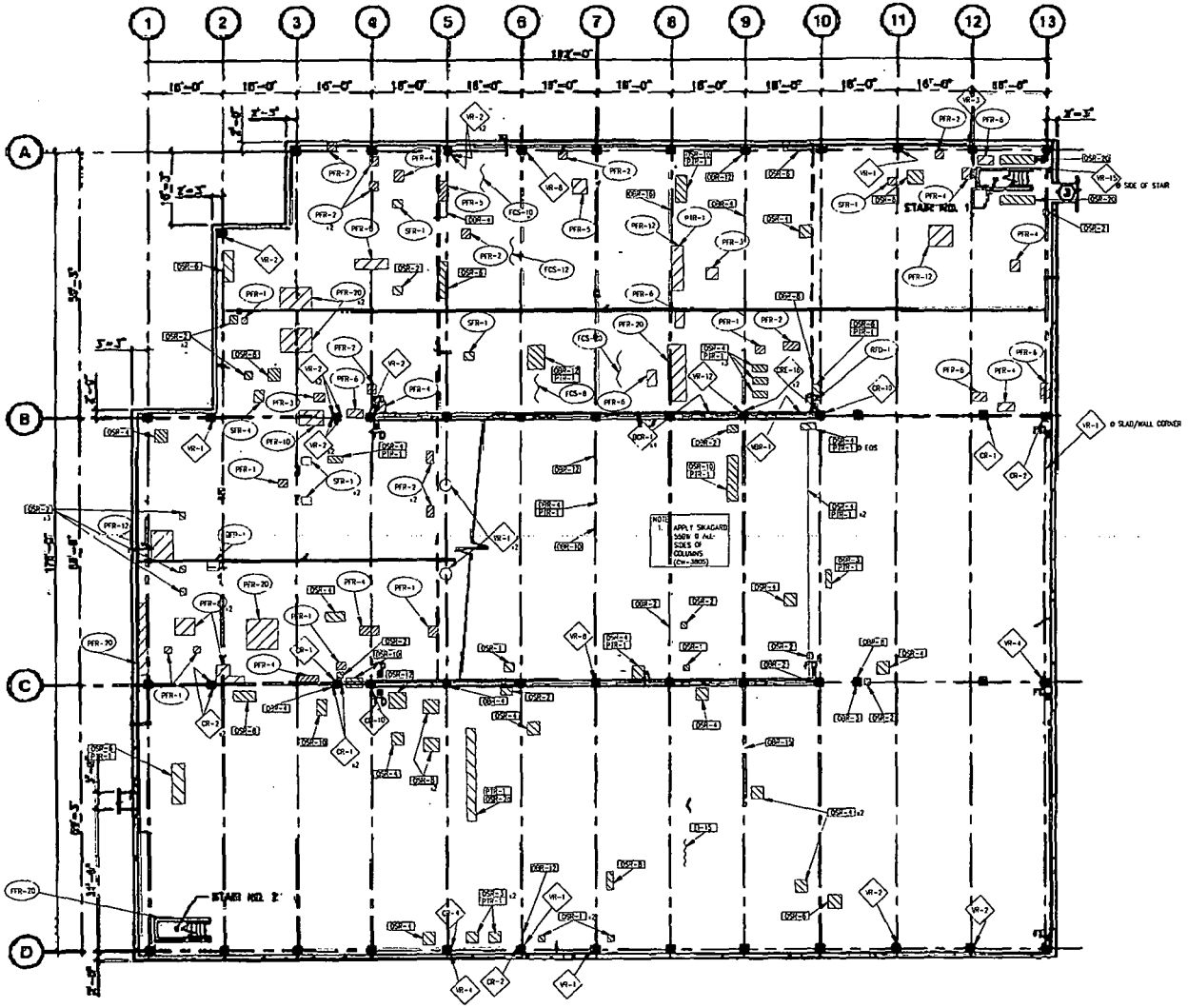
DATE: 09/27/2019

SHEET TITLE:
PHASE II TOP LEVEL RESTORATION PLAN

SHEET NO.
R2.1

RFB #7527
EXHIBIT I



1 / R2.2 MIDDLE LEVEL PLAN (PHASE II)
N.T.S

LEGEND

FLOOR REPAIR
REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE — QUANTITY

OVERHEAD REPAIR
REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE — QUANTITY

VERTICAL REPAIR
REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE — QUANTITY

REPAIR AREAS ON PLAN ARE DEPICTED ON THE FOLLOWING SURFACES:

PLAN / OVERHEAD FLOOR

- PARTIAL DEPTH FLOOR REPAIR OR CURB REPAIR
- OVERHEAD FLOOR REPAIR
- FULL DEPTH FLOOR REPAIR
- CONCRETE OVERLAY REPAIR
- TRAFFIC DECK MEMBRANE REPAIR OR REPLACEMENT
- STATIC FLOOR CRACK REPAIR

FLOOR REPAIR

PFR	PARTIAL DEPTH FLOOR REPAIR
CRB	CURB REPAIR
EJ	EXPANSION JOINT REPLACEMENT
PTR	POST TENSION REPAIR
FCS	STATIC FLOOR CRACK REPAIR
SFR	SHALLOW DEPTH FLOOR REPAIR
FFR	FULL DEPTH FLOOR REPAIR
ATR	ADDITIONAL TOPPING TO RE-SLOPE
RAR	RE-LEVEL ACCESSIBLE ROUTE
SR	SEALANT REPLACEMENT
TCR	TRAFFIC DECK COATING REMOVAL
TCA	TRAFFIC DECK COATING APPLICATION-URETHANE
PMR	PAVEMENT MARKING RE-PAINTING
SFD	SUPPLEMENTAL FLOOR DRAIN
RFD	FLOOR DRAIN REPLACEMENT

OVERHEAD REPAIR

EI	EPOXY INJECTION
OSR	OVERHEAD SURFACE REPAIR
OBR	OVERHEAD BEAM REPAIR

VERTICAL REPAIR

VR	VERTICAL REPAIR
VRE	VERTICAL REPAIR EXTERIOR
VSR	VERTICAL SEALANT REPAIR
EWI	WET PROCY INJECTION
BRP	BRICK REPOINTING (STD. SIZE)
BR	BRICK REPLACEMENT
ESR	EDGE OF SLAB REPAIR WITH STRESSING COUPLER
ERS1	EDGE OF SLAB REPAIR WITH STRESSING ANCHORAGE
ESR3	PIT TENDON STRESSING COUPLER REPAIR
ESR3	PIT &TRESSING ANCHORAGE REPAIR
CR	COLUMN REPAIR
STR	STAIR REPLACEMENT
GRI	GUARDRAIL INSTALLATION @ ADA SPACES
RS	REPLACE SIGNAGE-ADA SPACES
SRR	STAIR RAILING REPLACEMENT
PR	PIPE REPLACEMENT
CW	COLUMN WATERPROOFING
BCR	BARRIER CABLE REPLACEMENT
CRE	COLUMN REPAIR WITH ENLARGEMENT
VBR	VEHICULAR BARRIER REPLACEMENT
LF	INTERIOR LIGHT FIXTURES
ELF	EXTERIOR POLE LIGHT FIXTURES

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PROFESSIONAL SEAL

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PROJECT NO.
NBR19122.00

PROJECT
GREENWICH TOWN HALL PARKING GARAGE

2019 RESTORATION

GREENWICH, CT

SUBMISSION / REVISIONS

NO.	DESCRIPTION	DATE

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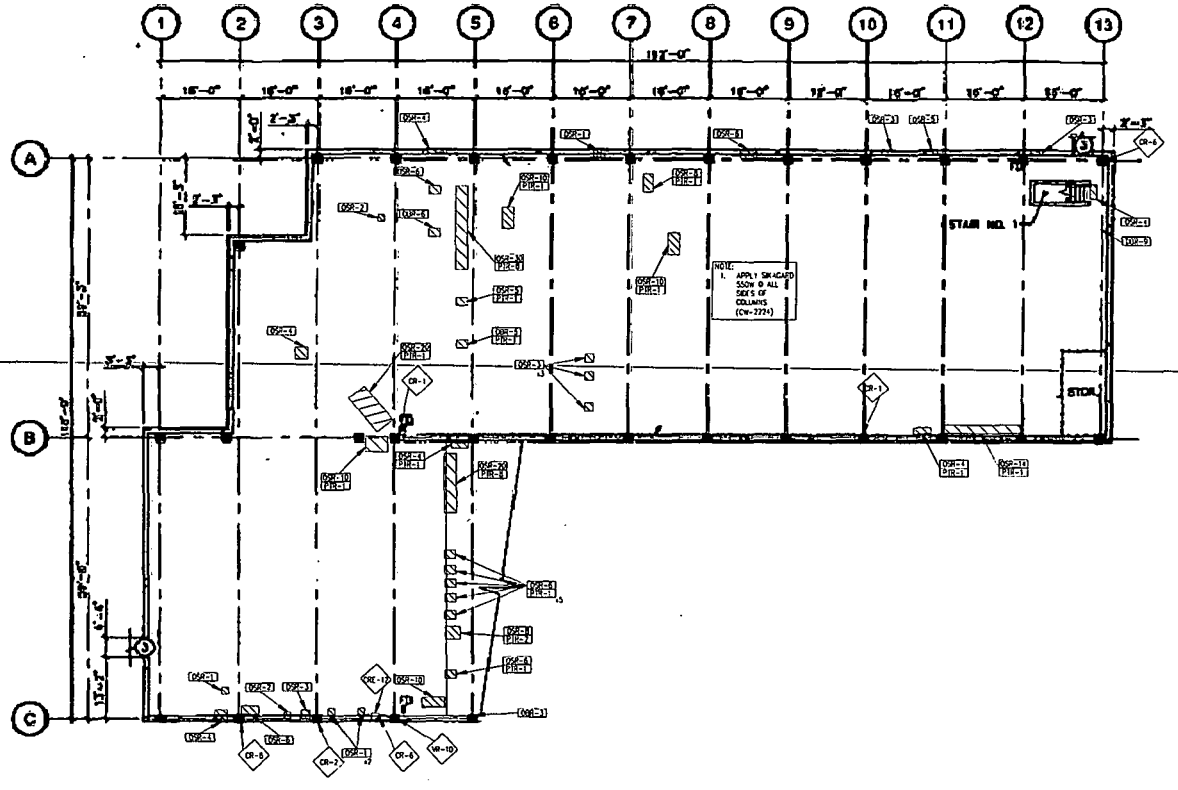
DATE 09/27/2019

SHEET TITLE:
PHASE II MIDDLE LEVEL RESTORATION PLAN

SHEET NO.
R2.2

RFB #7527
EXHIBIT I



1 / R2.3 BOTTOM LEVEL PLAN (PHASE II)
N.T.S

LEGEND

FLOOR REPAIR
REPAIR TYPE OF REFERENCE — (CR-2) (9) — # OF LOCATIONS PER REFERENCE — QUANTITY

OVERHEAD REPAIR
REPAIR TYPE OF REFERENCE — (VR-2) (9) — # OF LOCATIONS PER REFERENCE — QUANTITY

VERTICAL REPAIR
REPAIR TYPE OF REFERENCE — (VR-2) (9) — # OF LOCATIONS PER REFERENCE — QUANTITY

REPAIR AREAS ON PLAN ARE DEPICTED ON THE FOLLOWING SURFACES:
PLAN X OVERHEAD FLOOR

- PARTIAL DEPTH FLOOR REPAIR OR CURB REPAIR
- OVERHEAD FLOOR REPAIR
- FULL DEPTH FLOOR REPAIR
- CONCRETE OVERLAY REPAIR
- TRAFFIC DECK MEMBRANE REPAIR OR REPLACEMENT
- STATIC FLOOR CRACK REPAIR

FLOOR REPAIR

PFR	PARTIAL DEPTH FLOOR REPAIR
CRB	CURB REPAIR
EJ	EXPANSION JOINT REPLACEMENT
PTR	POST TENSION REPAIR
FCS	STATIC FLOOR CRACK REPAIR
SDFR	SHALLOW DEPTH FLOOR REPAIR
FFR	FULL DEPTH FLOOR REPAIR
ATR	ADDITIONAL TOPPING TO RE-SLOPE
RAR	RE-LEVEL ACCESSIBLE ROUTE
SR	SEALANT REPLACEMENT
TCR	TRAFFIC DECK COATING REMOVAL
TCA	TRAFFIC DECK COATING APPLICATION-URETHANE
PMR	PAVEMENT MARKING RE-PAINTING
SFD	SUPPLEMENTAL FLOOR DRAIN
RFD	FLOOR DRAIN REPLACEMENT

OVERHEAD REPAIR

EI	EPOXY INJECTION
OSR	OVERHEAD SURFACE REPAIR
OBR	OVERHEAD BEAM REPAIR

VERTICAL REPAIR

VR	VERTICAL REPAIR
VRE	VERTICAL REPAIR EXTERIOR
VSR	VERTICAL SEALANT REPAIR
EIN	WET PROXY INJECTION
BRP	BRICK REPOINTING (STO, SIZE)
BR	BRICK REPLACEMENT
ESR	EDGE OF SLAB REPAIR WITH STRESSING COUPLER
ESR1	EDGE OF SLAB REPAIR WITH STRESSING ANCHORAGE
ESR2	PT TENDON STRESSING COUPLER REPAIR
ESR3	PT STRESSING ANCHORAGE REPAIR
CR	COLUMN REPAIR
STR	STAIR REPLACEMENT
GRJ	GUARDRAIL INSTALLATION @ ADA SPACES
RS	REPLACE SIGNAGE-ADA SPACES
SRR	STAIR RAILING REPLACEMENT
PR	PIPE REPLACEMENT
CW	COLUMN WATERPROOFING
BCR	BARRIER CABLE REPLACEMENT
CRE	COLUMN REPAIR WITH ENLARGEMENT
VBR	VEHICULAR BARRIER REPLACEMENT
ILF	INTERIOR LIGHT FIXTURES
ELF	EXTERIOR POLE LIGHT FIXTURES

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2019 RESTORATION

GREENWICH, CT

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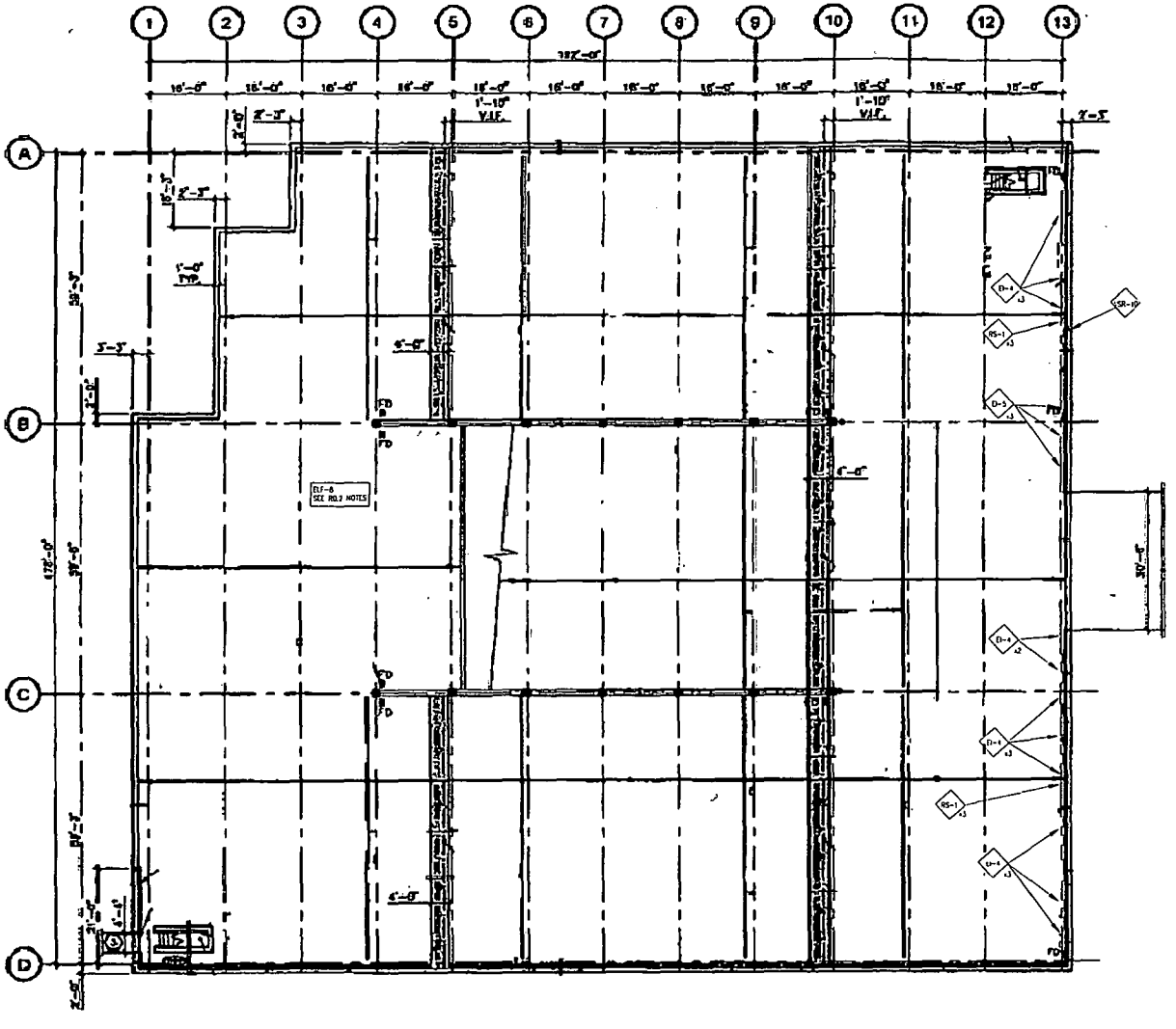
SHEET TITLE
PHASE II BOTTOM LEVEL RESTORATION PLAN

SHEET NO.
R2.3

RFB #7527

EXHIBIT I



1 / R3.1 TOP LEVEL PLAN (PHASE III)
N.T.S

LEGEND

FLOOR REPAIR

REPAIR TYPE OF REFERENCE — XX-X (YY) — # OF LOCATIONS PER REFERENCE / QUANTITY

OVERHEAD REPAIR

REPAIR TYPE OF REFERENCE — XX-X (Y) — # OF LOCATIONS PER REFERENCE / QUANTITY

VERTICAL REPAIR

REPAIR TYPE OF REFERENCE — XX-X (Y) — # OF LOCATIONS PER REFERENCE / QUANTITY

REPAIR AREAS ON PLAN ARE DEPICTED ON THE FOLLOWING SURFACES:

PLAN X OVERHEAD FLOOR

- PARTIAL DEPTH FLOOR REPAIR OR CURB REPAIR
- OVERHEAD FLOOR REPAIR
- FULL DEPTH FLOOR REPAIR
- CONCRETE OVERLAY REPAIR
- TRAFFIC DECK MEMBRANE REPAIR OR REPLACEMENT
- STATIC FLOOR CRACK REPAIR

FLOOR REPAIR

PFR	PARTIAL DEPTH FLOOR REPAIR
CRB	CURB REPAIR
EJ	EXPANSION JOINT REPLACEMENT
PTR	POST TENSION REPAIR
FCS	STATIC FLOOR CRACK REPAIR
SFR	SHALLOW DEPTH FLOOR REPAIR
FFR	FULL DEPTH FLOOR REPAIR
ATR	ADDITIONAL TOPPING TO RE-SLOPE
RAR	RE-LEVEL ACCESSIBLE ROUTE
SR	SEALANT REPLACEMENT
TCR	TRAFFIC DECK COATING REMOVAL
TCA	TRAFFIC DECK COATING APPLICATION/URETHANE
PMR	PAVEMENT MARKING RE-PAINTING
SFD	SUPPLEMENTAL FLOOR DRAIN
RFD	FLOOR DRAIN REPLACENT

OVERHEAD REPAIR

EI	EPOXY INJECTION
OSR	OVERHEAD SURFACE REPAIR
OBR	OVERHEAD BEAM REPAIR

VERTICAL REPAIR

VR	VERTICAL REPAIR
VRE	VERTICAL REPAIR EXTERIOR
VSR	VERTICAL SEALANT REPAIR
EIW	WET PROXY INJECTION
BRP	BRICA REPOINTING (STD. SIZE)
BR	BRICA REPLACEMENT
ESR	EDGE OF SLAB REPAIR WITH STRESSING COUPLER
ERS1	EDGE OF SLAB REPAIR WITH STRESSING ANCHORAGE
ESR2	PIT (EXIDOH) STRESSING COUPLER REPAIR
ESR3	PIT STRESSING ANCHORAGE REPAIR
CR	COLUMN REPAIR
STR	STAIR REPLACEMENT
GRI	GUARDRAIL INSTALLATION @ ADA SPACES
RS	REPLACE SIGNAGE-ADA SPACES
SRR	STAIR RAILING REPLACEMENT
PR	PIPE REPLACEMENT
CW	COLUMN WATERPROOFING
BCR	BARRIER CABLE REPLACEMENT
CRE	COLUMN REPAIR WITH ENLARGEMENT
VBR	VEHICULAR BARRIER REPLACEMENT
ILF	INTERIOR LIGHT FIXTURES
ELF	EXTERIOR POLE LIGHT FIXTURES

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2019 RESTORATION

GREENWICH, CT

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SHEET TITLE

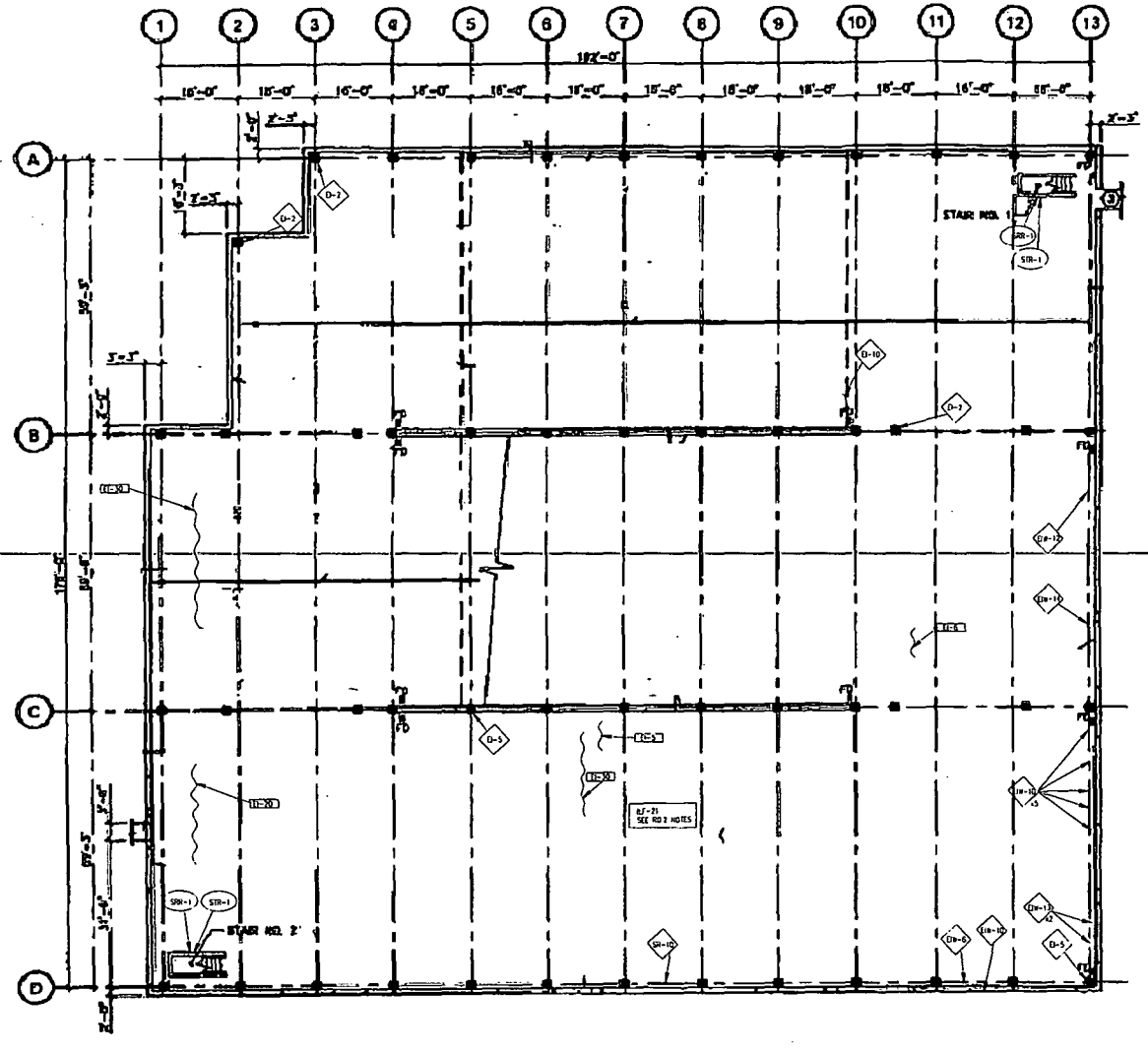
PHASE III TOP LEVEL RESTORATION PLAN

SHEET NO.

R3.1

RFB #7527

EXHIBIT I



1 R3.2 MIDDLE LEVEL PLAN (PHASE III)
N.T.S

LEGEND

FLOOR REPAIR

REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE — QUANTITY

OVERHEAD REPAIR

REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE — QUANTITY

VERTICAL REPAIR

REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE — QUANTITY

REPAIR AREAS ON PLAN ARE DEPICTED ON THE FOLLOWING SURFACES

PLAN — OVERHEAD FLOOR

- PARTIAL DEPTH FLOOR REPAIR OR CURB REPAIR
- OVERHEAD FLOOR REPAIR
- FULL DEPTH FLOOR REPAIR
- CONCRETE OVERLAY REPAIR
- TRAFFIC DECK MEMBRANE REPAIR OR REPLACEMENT
- STATIC FLOOR CRACK REPAIR

FLOOR REPAIR

PFR	PARTIAL DEPTH FLOOR REPAIR
CRB	CURB REPAIR
EJ	EXPANSION JOINT REPLACEMENT
PTR	POST TENSION REPAIR
FCS	STATIC FLOOR CRACK REPAIR
SFR	SHALLOW DEPTH FLOOR REPAIR
FFR	FULL DEPTH FLOOR REPAIR
ATR	ADDITIONAL TOPPING TO RE-SLOPE
RAR	RE-LEVEL ACCESSIBLE ROUTE
SR	SEALANT REPLACEMENT
TCR	TRAFFIC DECK COATING REMOVAL
TCA	TRAFFIC DECK COATING APPLICATION-URETHANE
PMR	PAVEMENT MARKING RE-PAINTING
SFD	SUPPLEMENTAL FLOOR DRAIN
RFD	FLOOR DRAIN REPLACEMENT

OVERHEAD REPAIR

EI	EPOXY INJECTION
OSR	OVERHEAD SURFACE REPAIR
OBR	OVERHEAD BEAM REPAIR

VERTICAL REPAIR

VR	VERTICAL REPAIR
VRE	VERTICAL REPAIR EXTERIOR
VSR	VERTICAL SEALANT REPAIR
EPI	WET EPOXY INJECTION
BRP	BRICK REPOINTING (STD. SIZE)
BR	BRICK REPLACEMENT
ESR	EDGE OF SLAB REPAIR WITH STRESSING COUPLER
ERSY	EDGE OF SLAB REPAIR WITH STRESSING ANCHORAGE
ESR2	PIT TEFDON STRESSING COUPLER REPAIR
ESRJ	PIT STRESSING ANCHORAGE REPAIR
CR	COLUMN REPAIR
STR	STAIR REPLACEMENT
GRI	GUARDRAIL INSTALLATION @ ADA SPACES
RS	REPLACE SIGNAGE-ADA SPACES
SRR	STAIR RAILING REPLACEMENT
PR	PIPE REPLACEMENT
CW	COLUMN WATERPROOFING
BCR	BARRIER CABLE REPLACEMENT
CRE	COLUMN REPAIR WITH ENLARGEMENT
VBR	VEHICULAR BARRIER REPLACEMENT
ILF	INTERIOR LIGHT FIXTURES
ELF	EXTERIOR POLE LIGHT FIXTURES

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PROFESSIONAL SEAL

CONSULTANT

PROJECT NO.
NBR19122.00

PROJECT

GREENWICH TOWN HALL PARKING GARAGE

2019 RESTORATION

GREENWICH, CT

SUBMISSIONS / REVISIONS

NO.	DESCRIPTION	DATE

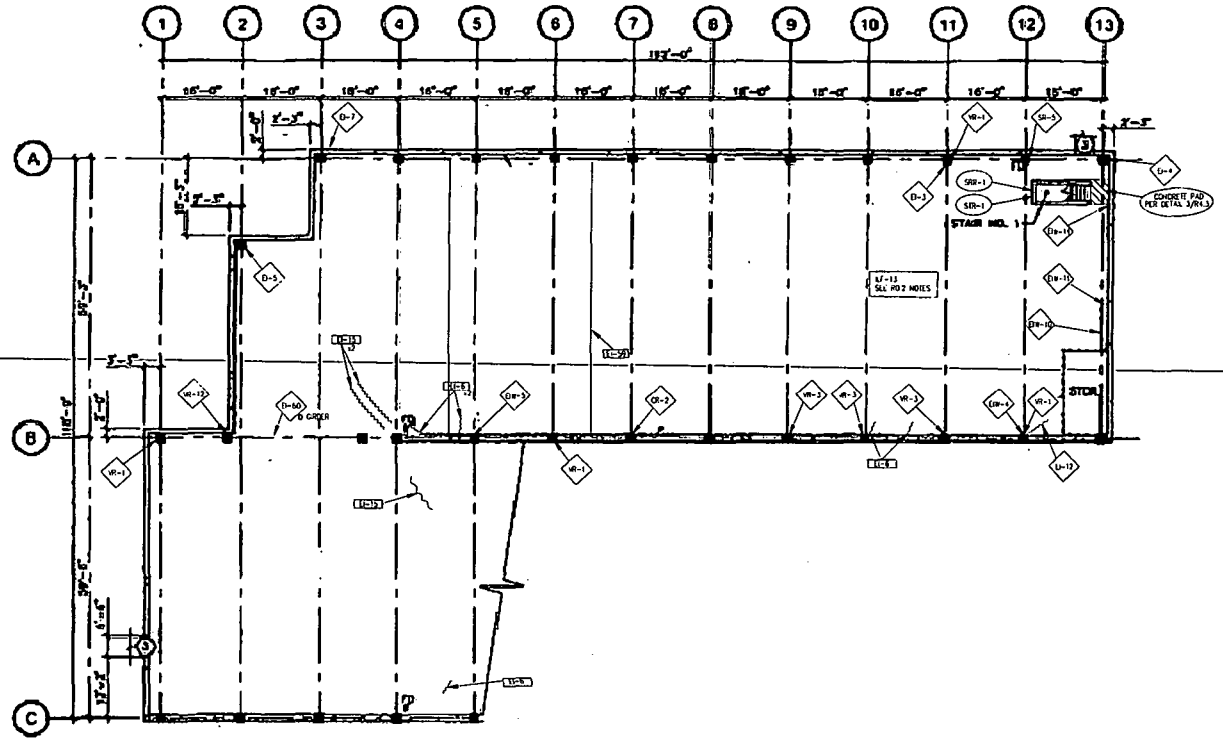
DRAWN: DC
REVIEWED: JCR
DATE: 09/27/2019

SHEET TITLE:
PHASE III MIDDLE LEVEL RESTORATION PLAN

SHEET NO.
R3.2

RFB #7527

EXHIBIT I



1 / R3.3 BOTTOM LEVEL PLAN (PHASE III)
N.T.S

LEGEND

FLOOR REPAIR
REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE — QUANTITY

OVERHEAD REPAIR
REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE — QUANTITY

VERTICAL REPAIR
REPAIR TYPE OF REFERENCE — # OF LOCATIONS PER REFERENCE — QUANTITY

REPAIR AREAS ON PLAN ARE DEPICTED ON THE FOLLOWING SURFACES:
PLAN — OVERHEAD FLOOR

- PARTIAL DEPTH FLOOR REPAIR OR CURB REPAIR
- OVERHEAD FLOOR REPAIR
- FULL DEPTH FLOOR REPAIR
- CONCRETE OVERLAY REPAIR
- TRAFFIC DECK MEMBRANE REPAIR OR REPLACEMENT
- STATIC FLOOR CRACK REPAIR

FLOOR REPAIR

PFR	PARTIAL DEPTH FLOOR REPAIR
CRB	CURB REPAIR
EJ	EXPANSION JOINT REPLACEMENT
PTR	POST TENSION REPAIR
FCS	STATIC FLOOR CRACK REPAIR
SFR	SHALLOW DEPTH FLOOR REPAIR
FFR	FULL DEPTH FLOOR REPAIR
ATR	ADDITIONAL TOPPING TO RE-SLOPE
RAR	RE-LEVEL ACCESSIBLE ROUTE
SR	SEALANT REPLACEMENT
TCR	TRAFFIC DECK COATING REMOVAL
TCA	TRAFFIC DECK COATING APPLICATION-URETHANE
PMR	PAVEMENT MARKING RE-PAINTING
SFD	SUPPLEMENTAL FLOOR DRAIN
RFD	FLOOR DRAIN REPLACENT

OVERHEAD REPAIR

EI	EPOXY INJECTION
OSR	OVERHEAD SURFACE REPAIR
OBR	OVERHEAD BEAM REPAIR

VERTICAL REPAIR

VR	VERTICAL REPAIR
VRE	VERTICAL REPAIR EXTERIOR
VSR	VERTICAL SEALANT REPAIR
EMI	WET EPOXY INJECTION
BRP	BRICK REPOINTING (STD. SIZE)
BR	BRICK REPLACEMENT
ESR	EDGE OF SLAB REPAIR WITH STRESSING COUPLER
ESR1	EDGE OF SLAB REPAIR WITH STRESSING ANCHORAGE
ESR2	PVI TENDON STRESSING COUPLER REPAIR
ESR3	PVI STRESSING ANCHORAGE REPAIR
CR	COLUMN REPAIR
STR	STAIR REPLACEMENT
GRI	GUARDRAIL INSTALLATION @ ADA SPACES
RS	REPLACE SIGNAGE-ADA SPACES
SRR	STAIR RAILING REPLACEMENT
PR	PIPE REPLACEMENT
CW	COLUMN WATERPROOFING
BCR	BARRIER CABLE REPLACEMENT
CRE	COLUMN REPAIR WITH ENLARGEMENT
VBR	VEHICULAR BARRIER REPLACEMENT
ILF	INTERIOR LIGHT FIXTURES
ELF	EXTERIOR POLE LIGHT FIXTURES

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PROJECT NO.
NBR19122.00

PROJECT

GREENWICH TOWN HALL PARKING GARAGE

2019 RESTORATION

GREENWICH, CT

SUBMISSIONS / REVISIONS

NO.	DESCRIPTION	DATE

DRAWN DC
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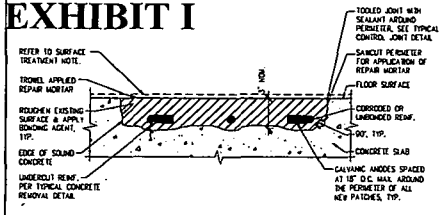
DATE 09/27/2019

SHEET TITLE:
PHASE III BOTTOM LEVEL RESTORATION PLAN

SHEET NO.
R3.3

RFB #7527

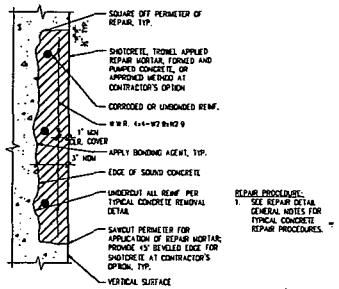
EXHIBIT I



REPAIR PROCEDURE:
1. SEE REPAIR DETAIL GENERAL NOTES FOR TYPICAL CONCRETE REPAIR PROCEDURES
2. INSTALL GALVANIC ANODES AT THE PERIMETER OF ALL REPAIR PATCHES PER SPEC SECTION 039000 AND MANUFACTURER'S RECOMMENDATIONS. VERIFY CONTINUITY & PROVIDE ADEQUATE CONCRETE COVER FOR GALVANIC ANODES. ANODES ARE NOT INCLUDED IN THE UNIT PRICE.
3. SURFACE TREATMENT NOTE: PENETRATING SEALER, PENETRATING CORROSION INHIBITING TREATMENT, TRAFFIC DECK MEMBRANE AND/OR OTHER SURFACE TREATMENT AS INDICATED AND APPLIED IN ACCORDANCE WITH MANUFACTURER REQUIREMENTS AND SPECIFICATIONS. IF SURFACE TREATMENT IS NOT INDICATED, APPLY PENETRATING SEALER TO THE REPAIR AND EXTEND 6" MIN. BEYOND PERIMETER OF REPAIR
4. DAMAGED P/T TENDONS AND P/T TENDONS THAT HAVE LOST OR LOSE TENSION DURING DEMO SHALL BE REPAIRED PER REPAIR TYPES PTAL, PTA, PTP, AND PTS AS APPROPRIATE.
5. DO NOT UNDERCUT P/T TENDONS WITHOUT ENGINEER'S APPROVAL.

1 R4.1 REPAIR TYPE PFR PARTIAL-DEPTH FLOOR REPAIR DETAIL

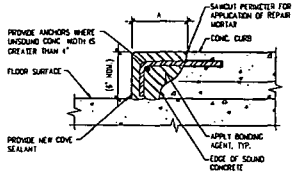
SCALE: N.T.S.



REPAIR PROCEDURE:
1. SEE REPAIR DETAIL GENERAL NOTES FOR TYPICAL CONCRETE REPAIR PROCEDURES.

2 R4.1 REPAIR TYPE VR VERTICAL REPAIR

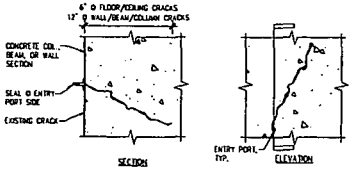
SCALE: N.T.S.



REPAIR PROCEDURE:
1. SEE REPAIR DETAIL GENERAL NOTES FOR TYPICAL CONCRETE REPAIR PROCEDURES
2. UNIT OF REPAIR AREA = (A) x LENGTH OF REPAIR = SF

3 R4.1 REPAIR TYPE CRB CURB REPAIR DETAIL

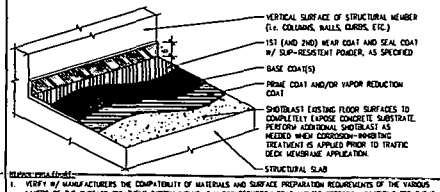
SCALE: N.T.S.



REPAIR PROCEDURE:
1. REFER TO EPOXY INJECTION GENERAL NOTES ON R2.1 & SPECIFICATION SECTION 03930 FOR ADDITIONAL REQUIREMENTS.
2. CLEAN THE SURFACE AREA ABOUT ½" (MIN.) WIDE ON EACH SIDE OF THE CRACK USING WIRE BRUSHING AND HIGH-PRESSURE WATER. "OIL FREE" COMPRESSED AIR TO REMOVE CONTAMINANTS, OIL, GREASE, DIRT, OR FINE PARTICLES OF CONCRETE.
3. INSTALL ENTRY PORTS (SURFACE-MOUNTED OR SOCKET MOUNTED) AT PROPER SPACING. USE SOCKET MOUNTED PORTS WHEN CRACKS ARE BLOCKED. ENTRY PORTS CAN BE CONNECTED BY A MANIFOLD SYSTEM WHEN SIMULTANEOUS INJECTION OF MULTIPLE PORT LOCATIONS IS ADVANTAGEOUS.
4. INSTALL THE CAP SEAL TO KEEP THE EPOXY FROM LEAKING OUT. INSTALL THE CAP SEAL ON BOTH SIDES OF THE CRACKED ELEMENT WHEN CRACKS PENETRATE COMPLETELY THROUGH SECTION. CAP SEALS COULD BE INSTALLED USING EPOXIES, POLYESTERS AND SILICONE CAULK. IF HIGH INJECTION PRESSURE IS NEEDED, CRACKS SHOULD BE CUT OUT TO A DEPTH OF ¾" AND WIDTH OF ¾" IN A V-SHAPE, FILLED WITH AN EPOXY AND STUCCO OFF FLUSH WITH THE SURFACE.
5. START WITH PROPER BATCHING AND MIXING OF EPOXY COMPONENTS IN STRICT ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS.
6. INJECT THE EPOXY WITH PROPER PRESSURE. INJECT VERTICAL CRACKS FROM BOTTOM UP UNTIL THE EPOXY LEVEL REACHES THE ENTRY PORT ABOVE. WHEN INJECTION INTO A PORT IS COMPLETE, CAP IT IMMEDIATELY.
7. UPON COMPLETION OF THE INJECTION PROCESS, REMOVE PORTS AND CAP SEAL BY GRINDING OR OTHER MEANS, AS APPROPRIATE.

4 R4.1 REPAIR TYPE EI & EIW EPOXY INJECTION REPAIR

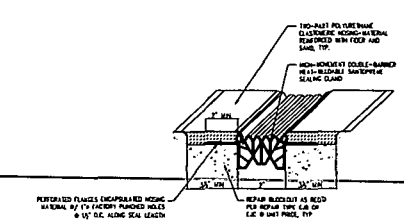
SCALE: N.T.S.



REPAIR PROCEDURE:
1. VERIFY W/ MANUFACTURER'S THE COMPATIBILITY OF MATERIALS AND SURFACE PREPARATION REQUIREMENTS OF THE VARIOUS LAYERS OF THE SURFACE TREATMENT SYSTEM INCLUDING VAPOR REDUCTION COAT AND/OR CORROSION-INHIBITING TREATMENT, WHEN APPLICABLE. PROVIDE MOCKUP AND HAVE TRAFFIC MEMBRANE MANUFACTURER'S REPRESENTATIVE PERFORM PULL TEST AND REPORT RESULTS TO ENGINEER FOR APPROVAL PRIOR TO PROCEEDING WITH WORK.
2. DEGREASE AND SHOT BLAST EXISTING FLOOR SURFACES TO REMOVE EXISTING LAITANCE, SEALERS, SEALANTS, SURFACE COATINGS, TRAFFIC PAINTING, AND FOREIGN SUBSTANCES.
3. PREPARE SURFACE & CRACKS IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS AND PROCEDURES. SEE SPECIFICATION SECTION 079020 FOR ADDITIONAL REQUIREMENTS.
4. APPLY COATING PER SPECIFICATION SECTION 079020 AND PER MANUFACTURER'S WRITTEN INSTRUCTIONS EXTEND MIN. 6" BEYOND NEWLY REPAIRED CONCRETE FLOOR PATCH PERIMETER AND VERTICAL SURFACES AS NOTED. EXTEND 6" OVER EXISTING DECK COATING WHERE APPLICABLE. PROVIDE REINFORCING FABRIC ABOVE 'RE-TO-TEE JOINTS PER REPAIR TYPE TRJ, AS REQUIRED.
5. CONTRACTOR TO RE-STRIPE PARKING STALLS TO MATCH EXISTING CONDITION. REFER TO SPECIFICATION 321723 FOR ADDITIONAL INFORMATION.

5 R4.1 REPAIR TYPE (TCA/TCR) TRAFFIC DECK COATING APPLICATION / REMOVAL

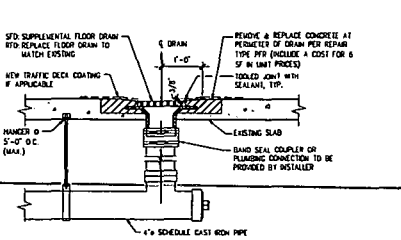
SCALE: N.T.S.



REPAIR PROCEDURE:
1. EXPANSION JOINT MANUFACTURER TO SIZE SEALING GLAND FOR FIELD MEASURED GAP AND TO ACCOUNT FOR ALL APPLICABLE MOVEMENT AFTER INSTALLATION.
2. THE CONTRACTOR MUST COORDINATE ACTUAL SIZE OF BLOCKOUTS REQUIRED BY EXPANSION JOINT MATERIAL.
3. VERIFY THE FOLLOWING INFORMATION WITH THE MANUFACTURER'S TECHNICAL REPRESENTATIVE AND SUBMIT THE SHOP DRAWINGS PRIOR TO ORDERING MATERIAL: JOINT SELECTED, FIELD MEASUREMENT, DATE TAKEN, OUTDOOR TEMPERATURE & STRUCTURE TEMPERATURE (TOP & BOTTOM).
4. REMOVE EXISTING JOINT & PREP JOINT SUBSTRATE AS REQUIRED PER MANUFACTURER'S REQUIREMENTS.
5. PROVIDE SPLICES PER TYPICAL EXPANSION JOINT SPLICE DETAIL & MANUFACTURER'S REQUIREMENTS, AS REQ'D. SEE TYPICAL EXPANSION JOINT SPLICE DETAIL FOR ADDITIONAL INFORMATION
6. THE EXPANSION JOINT SYSTEM MUST BE ADA ACCESSIBLE.
7. USE WALL EXPANSION JOINT WHERE APPLICABLE.

6 R4.1 REPAIR TYPE EJ EXPANSION JOINT REPLACEMENT

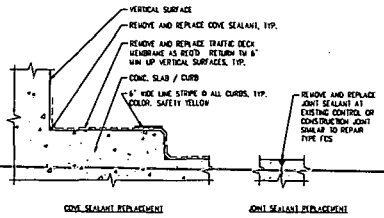
SCALE: N.T.S.



REPAIR PROCEDURE:
1. GRIND Ø SMOOTH HIGH SURFACE AREA TO OBTAIN POSITIVE SLOPE FOR DRAINAGE (MIN. ¼" PER FT).
2. PROVIDE ¾" PER FT. MIN PITCH & CONNECT TO EXISTING DRAIN LINE. RUN PIPE ADJACENT TO BEAM AND MAINTAIN HEADROOM CLEARANCE AT DRIVE LANES. PROVIDE ELBOWS, CLEANOUTS & OTHER CONNECTIONS AS REQUIRED TO ROUTE PIPE TO EXISTING DRAIN LINE & MEET CODE REQUIREMENTS. RUN PIPE AS HIGH AS POSSIBLE AT PARKING SPACES TO MINIMIZE PROJECTIONS BELOW STRUCTURE. RUN PIPE TIGHT TO COLUMNS OR WALLS IF POSSIBLE. PROVIDE AN ALLOWANCE OF 50 LF OF PIPING PER SUPPLEMENTAL DRAIN AND 10 LF OF PIPING PER INSTALLED DRAIN FOR BIDDING PURPOSES, U.N.O. ON PLAN.
3. LOCATE REINFORCING, CONDUIT, AND OTHER OBSTRUCTIONS PRIOR TO PUNCHING THROUGH SLAB
4. DO NOT DAMAGE EXISTING EMBEDDED MATERIAL AND NOTIFY ENGINEER PRIOR TO REMOVING ANY REINFORCING
5. INSTALL WATTS DRAINAGE FD-200 EPOXY COATED CAST IRON PARKING DECK DRAIN OR EQUAL.
6. AT REPAIR TYPE SFD, DRAIN LOCATION TO BE DETERMINED IN THE FIELD BASED ON ACTUAL WATER PONDING AT LOW SPOTS.

7 R4.1 REPAIR TYPE SFD & RFD SUPPLEMENTAL & REPLACEMENT FLOOR DRAIN

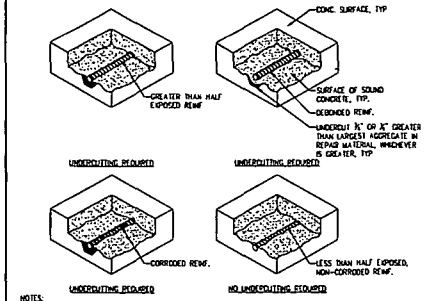
SCALE: N.T.S.



REPAIR PROCEDURE:
1. SEE REPAIR PROCEDURES ON REPAIR TYPE FCS FOR ADDITIONAL INFO
2. UNIT PRICE ONLY INCLUDES PER LF OF COVE OR JOINT SEALANT REPLACEMENT. OTHER INFORMATION SHOWN IS INCLUDED IN OTHER REPAIR TYPES, WHERE APPLICABLE.

8 R4.1 REPAIR TYPE SR SEALANT REPLACEMENT

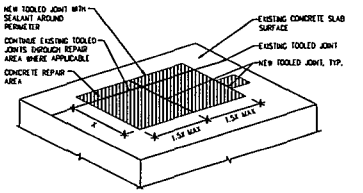
SCALE: N.T.S.



NOTES:
1. SEE REPAIR DETAIL GENERAL NOTES FOR ADDITIONAL INFORMATION.
2. UNDERCUTTING REQUIRED AT ALL VERTICAL AND OVERHEAD SURFACES
3. ANY REINFORCEMENT WITH SECTION LOSS GREATER THAN 20% SHALL BE REPLACED.
4. ALL REBAR SHALL BE SANDBLASTED CLEAN AND TREATED WITH CORROSION INHIBITING COATING MATERIALS PER SPECIFICATIONS

9 R4.1 TYPICAL CONCRETE REMOVAL DETAIL

SCALE: N.T.S.



NOTES:
1. IF NO EXISTING TOOLED JOINT IS PRESENT, DIMENSION "X" SHALL REFER TO THE FULL WIDTH OF THE REPAIR.
2. PROVIDE TOOLED JOINTS SUCH THAT DIMENSION "X" IS NO GREATER THAN 6 FEET AT ANY REPAIR LOCATION. REFER TO REPAIR TYPE FCS / SR FOR TOOLED JOINT DIMENSIONS AND ADDITIONAL INFORMATION

10 R4.1 TYPICAL CONTROL JOINT DETAIL

SCALE: N.T.S.

REPAIR DETAIL GENERAL NOTES:
1. REFER TO SHEET R0.1 FOR GENERAL NOTES
2. REFER TO RESTORATION PLANS FOR APPROXIMATE SIZE AND LOCATIONS OF REPAIR AREAS.
3. DETAILS SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY. EXACT CONDITIONS VARY (i.e. DIMENSIONS, REBAR, ANODES, ETC.)
4. TYPICAL CONCRETE REPAIR PROCEDURES ARE AS FOLLOWS, U.N.O:
   A. THE DRAWINGS INDICATE THE AREAS THAT HAVE BEEN DETERMINED TO REQUIRE REPAIR PER ENGINEER'S FIELD SURVEY. CONTRACTOR SHALL SOUND SURFACES WITH HAMMER, ROD, CHAIN, OR APPROPRIATE TOOL TO DETECT DELAMINATION EXTENTS. SEE "GENERAL SURFACE PREPARATION" ON SHEET R0.1.
   B. SAWCUT ¾" MIN. PERIMETER OF REPAIR AREAS TO AVOID CUTTING REINFORCEMENT.
   C. REMOVE DELAMINATED CONCRETE TO SOUND CONCRETE. IF REINFORCEMENT IS GREATER THAN HALF EXPOSED, DEBONDED FROM CONCRETE, OR CORRODED, UNDERCUT REINFORCEMENT ¾" OR ¾" LARGER THAN THE LARGEST AGGREGATE IN REPAIR MATERIAL, WHICHEVER IS GREATER, U.N.O. SEE TYPICAL CONCRETE REMOVAL DETAIL FOR CLARIFICATION. UNDERCUT REINFORCEMENT AT ALL VERTICAL AND OVERHEAD REPAIRS
   D. CARE SHALL BE TAKEN NOT TO BREAK NON-CORRODED REINFORCEMENT BOND TO SURROUNDING CONCRETE. IF BOND IS BROKEN, UNDERCUTTING OF THE REINFORCEMENT IS REQUIRED.
   E. PROVIDE RIGHT ANGLE CUTS / SQUARE OFF ENDS ALONG PERIMETER OF REPAIR AREAS.
   F. CLEAN SURFACE FREE OF DUST, LAITANCE, AND OTHER INHIBITING MATERIALS AS INDICATED UNDER "GENERAL SURFACE PREPARATION" ON SHEET R0.1
   G. DAMAGED REINFORCEMENT WITH SECTION LOSS LESS THAN 20% SHALL BE PREPARED AS INDICATED UNDER "GENERAL SURFACE PREPARATION" ON SHEET R0.1
   H. DAMAGED REINFORCEMENT WITH SECTION LOSS GREATER THAN 20% SHALL BE SUPPLEMENTED AND DEVELOPED INTO EXISTING REINFORCEMENT. ADDITIONAL REINFORCEMENT SHALL BE SUPPLIED AT UNIT COST, U.N.O
   I. ALL EXISTING EXPOSED STEEL SHALL BE COATED WITH STEEL CORROSION INHIBITING TREATMENT IN ACCORDANCE WITH SPECIFICATION SECTION 039300.
   J. PREPARE THE SCARIFIED CONCRETE SUBSTRATE TO RECEIVE NEW REPAIR MORTAR/CONCRETE, INCLUDING APPLYING APPLICABLE BONDING AGENT OR PREPARING THE SURFACE TO A SATURATED SURFACE DRY (AS DEFINED BY ICRI) IF A MORTAR SCRUB COAT IS USED, COMPLY WITH ICRI AND THE MANUFACTURER'S RECOMMENDATIONS. IF A BONDING AGENT IS USED ASSURE THAT CONCRETE IS PLACED WITHIN THE OPEN TIME AS DOCUMENTED BY THE MANUFACTURER, WITH CONSIDERATION OF TEMPERATURE AND HUMIDITY.
   K. PROVIDE ½" CONC. COVER U.N.O; IF REQUIRED COVER IS NOT ACHIEVABLE, MOUND CONCRETE TO PROVIDE MINIMUM COVER OVER MAJORITY OF REINFORCEMENT WHILE MAINTAINING REQUIRED HEADROOM. IF HEADROOM CANNOT BE ACHIEVED, CONSULT ENGINEER.
   L. PLACE REPAIR MORTAR IN SHADED AREA PER MANUFACTURER'S REQUIREMENTS & SPECIFICATION SECTION 039300. CONCRETE PER SPECIFICATION SECTION 033000 MAY BE USED AT CONTRACTOR'S OPTION FOR DEPTH GREATER THAN 3", U.N.O
   M. RE-PAINT PARKING STALLS & TRAFFIC MARKINGS AS REQUIRED TO MATCH EXISTING CONDITIONS

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PROFESSIONAL SEAL

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PROJECT NO.
NBR19122.00

PROJECT

GREENWICH TOWN HALL PARKING GARAGE

2019 RESTORATION

GREENWICH, CT

SUBMISSIONS / REVISIONS

NO.	DESCRIPTION	DATE

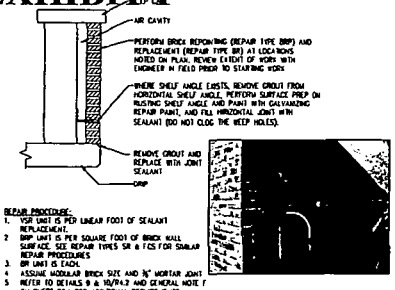
DRAWN: DC
REVIEWED: JCR
DATE: 09/27/2019

SHEET TITLE:
REPAIR DETAILS

SHEET NO.
R4.1

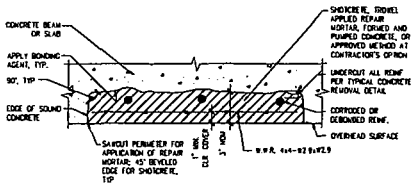
RFB #7527

EXHIBIT I



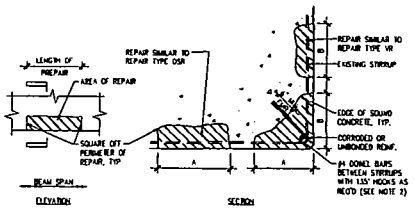
REPAIR PROCEDURE:
1. VSR UNIT IS PER LINEAR FOOT OF SEALANT REPLACEMENT.
2. BRP UNIT IS PER SQUARE FOOT OF BRICK WALL SURFACE. SEE REPAIR TYPES SR & FCS FOR SIMILAR REPAIR PROCEDURES
3. BR UNIT IS EACH.
4. ASSUME MODULAR BRICK SIZE AND ⅜" MORTAR JOINT
5. REFER TO DETAILS 9 & 10/R4.2 AND GENERAL NOTE F ON SHEET R0.1 FOR ADDITIONAL REQUIREMENTS.

1 / R4.2 REPAIR TYPE VSR
SEALANT REPLACEMENT AT VERTICAL SURFACES
BRP - BRICK REPOINTING & BR - BRICK REPLACEMENT
SCALE N.T.S.



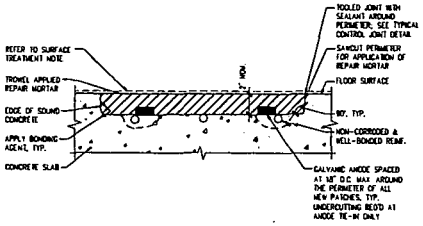
REPAIR PROCEDURE:
1. SEE REPAIR DETAIL GENERAL NOTES FOR TYPICAL CONCRETE REPAIR PROCEDURES
2. APPLY REPAIR MORTAR APPROVED BY THE ENGINEER AS INDICATED IN THE SHADED AREA BY SHOTCRETE, FORMED AND PUMPED CONCRETE, OR OTHER APPROVED METHOD AT CONTRACTOR'S OPINION. SEE SPECS FOR ADDT'L INFO
3. DAMAGED P/T TENDONS AND P/T TENDONS THAT HAVE LOST OR LOSE TENSION DURING DEMO SHALL BE REPAIRED PER REPAIR TYPES ESR, ESR1, ESR2, ESR3, PTR, AND PTS.
4. DO NOT UNDERCUT P/T TENDONS WITHOUT ENGINEER'S APPROVAL.

2 / R4.2 REPAIR TYPE OSR
OVERHEAD SURFACE REPAIR DETAIL
SCALE N.T.S.



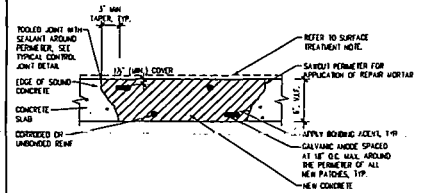
REPAIR PROCEDURE:
1. SEE REPAIR DETAIL GENERAL NOTES FOR TYPICAL CONCRETE REPAIR PROCEDURES.
2. FOR CAVITIES DEEPER THAN 6", PROVIDE #4 ADHESIVE DOWEL BARS WITH 135° HOOKS IN BETWEEN STIRRUPS AT A MAXIMUM SPACING OF 8" O.C.
3. UNIT OF REPAIR = Σ (A + B) x LENGTH OF REPAIR = SF.
4. FOR BIDDING PURPOSES, ASSUME REPAIR DEPTH = 3" NOMINAL.

3 / R4.2 REPAIR TYPE OBR
OVERHEAD BEAM REPAIR
SCALE N.T.S.



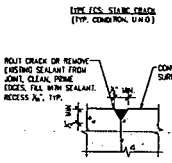
REPAIR PROCEDURE:
1. SEE REPAIR DETAIL GENERAL NOTES FOR TYPICAL CONCRETE REPAIR PROCEDURES
2. INSTALL GALVANIC ANODES AT THE PERIMETER OF ALL REPAIR PATCHES PER MANUFACTURER'S RECOMMENDATIONS. VERIFY CONTINUITY & PROVIDE ADEQUATE CONCRETE COVER FOR GALVANIC ANODES. ANODES ARE NOT INCLUDED IN THE UNIT PRICE.
3. TO BE USED IN LIEU OF REPAIR TYPE PTR BASED ON FIELD CONDITIONS
4. SURFACE TREATMENT NOTE: PENETRATING SEALER, PENETRATING CORROSION INHIBITING TREATMENT, TRAFFIC DECK MEMBRANE AND/OR OTHER SURFACE TREATMENT AS INDICATED AND APPLIED IN ACCORDANCE WITH MANUFACTURER REQUIREMENTS AND SPECIFICATIONS. IF SURFACE TREATMENT IS NOT INDICATED, APPLY PENETRATING SEALER TO THE REPAIR AND EXTEND 6" MIN. BEYOND PERIMETER OF REPAIR.
5. DAMAGED P/T TENDONS AND P/T TENDONS THAT HAVE LOST OR LOSE TENSION DURING DEMO SHALL BE REPAIRED PER REPAIR TYPES ESR, ESR1, ESR2 AND ESR3 AS APPROPRIATE
6. DO NOT UNDERCUT P/T TENDONS WITHOUT ENGINEER'S APPROVAL.

4 / R4.2 REPAIR TYPE SFR
SHALLOW-DEPTH FLOOR REPAIR DETAIL
SCALE N.T.S.



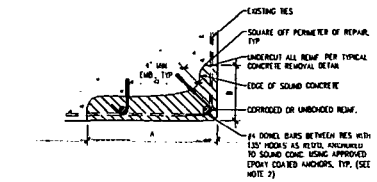
REPAIR PROCEDURE:
1. SEE REPAIR DETAIL GENERAL NOTES FOR TYPICAL CONCRETE REPAIR PROCEDURES.
2. INSTALL GALVANIC ANODES AT THE PERIMETER OF ALL REPAIR PATCHES PER MANUFACTURER'S RECOMMENDATIONS. VERIFY CONTINUITY & PROVIDE ADEQUATE CONCRETE COVER FOR GALVANIC ANODES. ANODES ARE NOT INCLUDED IN THE UNIT PRICE.
3. SURFACE TREATMENT NOTE: PENETRATING SEALER, PENETRATING CORROSION INHIBITING TREATMENT, TRAFFIC DECK MEMBRANE AND/OR OTHER SURFACE TREATMENT AS INDICATED AND APPLIED IN ACCORDANCE WITH MANUFACTURER REQUIREMENTS AND SPECIFICATIONS. IF SURFACE TREATMENT IS NOT INDICATED, APPLY PENETRATING SEALER TO THE REPAIR AND EXTEND 6" MIN. BEYOND PERIMETER OF REPAIR.
4. DAMAGED P/T TENDONS AND P/T TENDONS THAT HAVE LOST OR LOSE TENSION DURING DEMO SHALL BE REPAIRED PER REPAIR TYPES ESR, ESR1, ESR2, ESR3, PTR, AND PTS AS APPROPRIATE.

5 / R4.2 REPAIR TYPE FFR
FULL-DEPTH FLOOR REPAIR DETAIL
SCALE N.T.S.



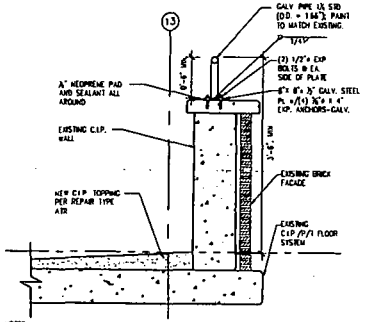
REPAIR PROCEDURE:
1. ROUT AT CENTER OF CRACK OR TOOLED JOINT TO FORM A GROOVE AND GRIND ANY UNEVEN SURFACES OR REMOVE SEALANT FROM EXISTING JOINT.
2. REMOVE DUST, FOREIGN PARTICLES, AND ANY BOND INHIBITING MATERIAL FROM SURFACE BY AIR OR SAND BLASTING AS REQUIRED
3. APPLY BOND BREAKER (IF APPLICABLE) & PRIME COATING TO SURFACE AND SEAL WITH AN APPROVED POLYURETHANE SEALANT IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS & SPECIFICATIONS
4. SEALANT MUST BE APPLIED EVENLY AND RECESSED ⅛" BELOW SURFACE. INSTALL SEALANT FLUSH WITH SURFACE FOR AREAS TO RECEIVE TRAFFIC DECK MEMBRANE. DO NOT OVERFILL JOINT.
5. SEE SPECIFICATION SECTION 079200 FOR ADDITIONAL REQUIREMENTS.
6. CRACKS IN REPAIR TYPE FCP SHALL BE GRAVITY FED WITH A POLYMER SEALER PER THE MANUFACTURER'S REQUIREMENTS AND PROCEDURES. FILL CRACKS WITH OVEN-DRIED SAND BEFORE GRAVITY FEEDING THE POLYMER SEALER. GRAVITY FEED THE POLYMER SEALER EVENLY.

6 / R4.2 REPAIR TYPE FCS
FLOOR CRACK REPAIR
SCALE N.T.S.



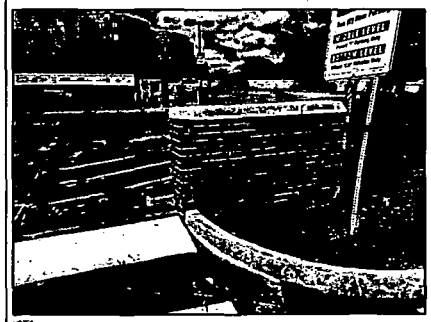
REPAIR PROCEDURE:
1. SEE REPAIR DETAIL GENERAL NOTES FOR TYPICAL CONCRETE REPAIR PROCEDURES.
2. FOR CAVITIES DEEPER THAN 6", PROVIDE #4 ADHESIVE DOWEL BARS WITH 135° HOOKS IN BETWEEN TIES AT A MAXIMUM SPACING OF 8" O.C.
3. REFER TO REPAIR TYPE VR FOR ADDITIONAL INFORMATION
4. UNIT OF REPAIR AREA = (A + B) x HEIGHT OF REPAIR = SF.
5. FOR BIDDING PURPOSES, ASSUME REPAIR DEPTH = 3" NOMINAL.

7 / R4.2 REPAIR TYPE CR
COLUMN REPAIR
SCALE N.T.S.



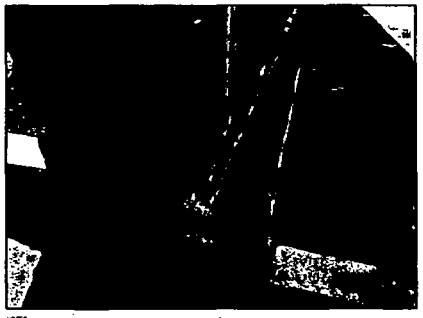
NOTES:
1. INSTALL GUARDRAIL AT SHOWN LOCATION TO PROVIDE THE REQUIRED 3'-6" HEIGHT FROM TOP OF THE TOPPING

8 / R4.2 REPAIR TYPE GRI
GUARDRAIL INSTALLATION
SCALE N.T.S.



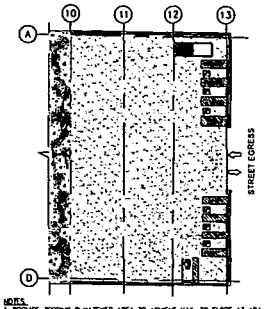
NOTES:
1. REPOINT MASONRY PER GENERAL NOTE F ON SHEET R0.1
2. PROVIDE SCAFFOLDING AS NEEDED TO ACCESS WORK

9 / R4.2 REPAIR TYPE BRP
BRICK REPOINTING
SCALE N.T.S.



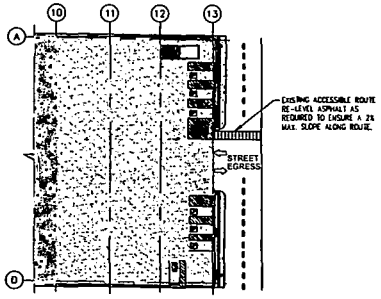
NOTES:
1. REPLACE MASONRY BLOCKS AS REQUIRED PER GENERAL NOTE F/R0.1.
2. CONTRACTOR IS TO INFORM ENGINEER AFTER REMOVING DAMAGED MASONRY BLOCKS TO ASSESS CONDITION.
3. PROVIDE SCAFFOLDING AS NEEDED TO ACCESS WORK.

10 / R4.2 REPAIR TYPE BR
BRICK REPLACEMENT
SCALE N.T.S.



NOTES:
1. PROVIDE TOPPING TO MATCHED AREA TO ACHIEVE MAX. 2% SLOPE AT ADA PARKING STALLS AND ALONG ADA EGRESS PATH

11 / R4.2 REPAIR TYPE ATR
ADDITIONAL TOPPING TO RE-SLOPE @ ADA SPACES
SCALE N.T.S.



12 / R4.2 REPAIR TYPE RAR
RE-LEVEL ACCESSIBLE ROUTE
SCALE N.T.S.

TimHaahs
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Timothy Haahs & Associates, Inc.
668 Lancaster Law Road
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Blue Bell, PA 19422
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PROFESSIONAL SEAL

CONSULTANT

PROJECT NO.
NBR19122.00

PROJECT
GREENWICH TOWN HALL PARKING GARAGE

2019 RESTORATION

GREENWICH, CT

SUBMISSIONS / REVISIONS

NO.	DESCRIPTION	DATE

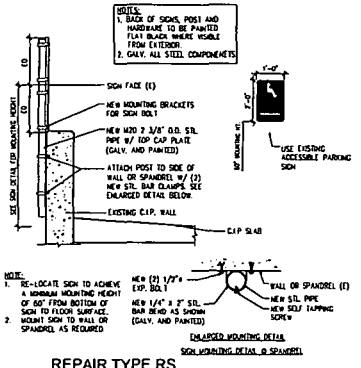
DRAWN DC
REVIEWED JCA
DATE 09/27/2019

SHEET TITLE
REPAIR DETAILS

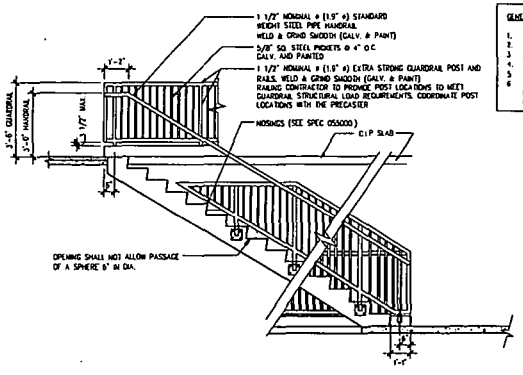
SHEET NO.
R4.2

RFB #7527

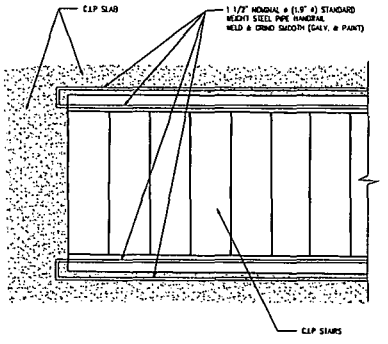
EXHIBIT I

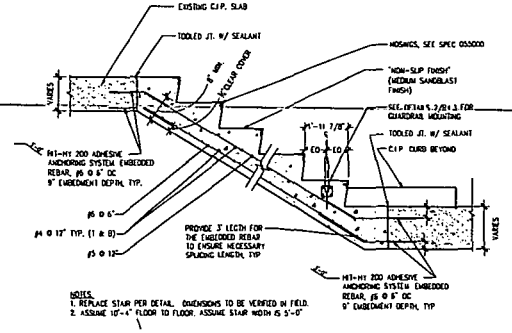


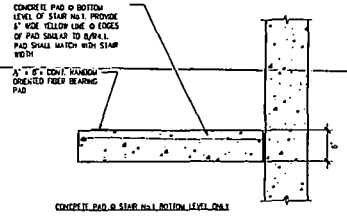
1 R4.3 REPAIR TYPE RS
REPLACE SIGNAGE-ADA SPACES
SCALE N.T.S.



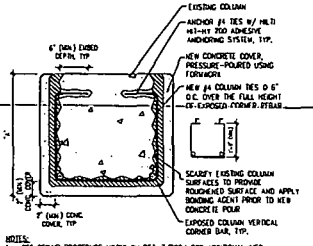
2 R4.3 REPAIR TYPE SRR
STAIR RAILING REPLACEMENT
SCALE: N.T.S.



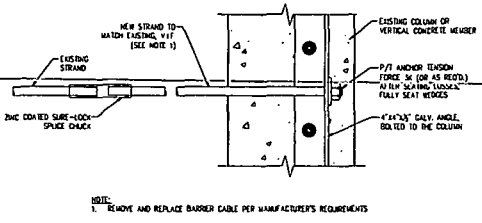




3 R4.3 REPAIR TYPE STR
STAIR REPLACEMENT
SCALE N.T.S.



4 R4.3 REPAIR TYPE CRE
COLUMN REPAIR WITH ENLARGEMENT
SCALE, N.T.S.



5 R4.3 REPAIR TYPE BRC
BARRIER CABLE REPLACEMENT
SCALE, N.T.S.

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PROFESSIONAL SEAL
CONSULTANT

PROJECT NO.
NBR19122.00
PROJECT

GREENWICH TOWN HALL PARKING GARAGE

2019 RESTORATION

GREENWICH, CT

SUBMISSIONS / REVISIONS

NO.	DESCRIPTION	DATE

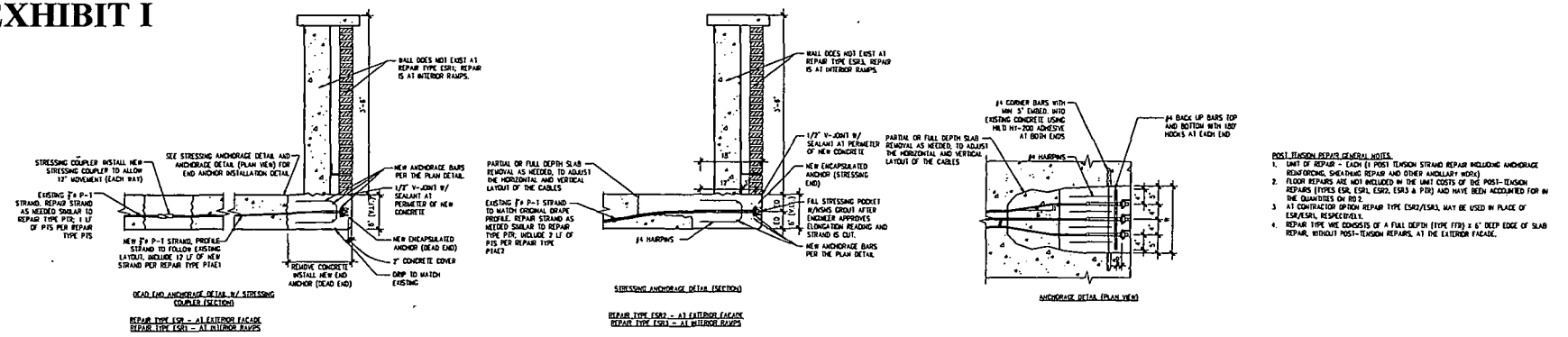
DRAWN DC
REVIEWED JCR
DATE 09/27/2019

SHEET TITLE:
REPAIR DETAILS

SHEET NO.
R4.3

RFB #7527

EXHIBIT I

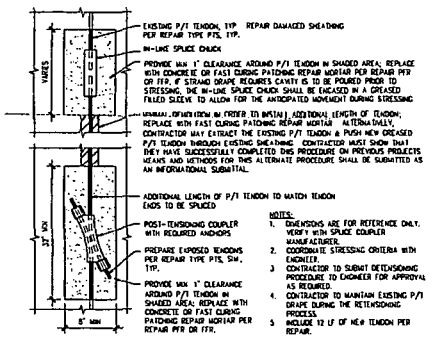


POST TENSION REPAIR GENERAL NOTES:

1. UNIT OF REPAIR - EACH (1 POST TENSION STRAND REPAIR INCLUDING ANCHORAGE REINFORCING, SHEATHING REPAIR AND OTHER ANCILLARY WORK)
2. FLOOR REPAIRS ARE NOT INCLUDED IN THE UNIT COSTS OF THE POST-TENSION REPAIRS (TYPES ESR, ESR1, ESR2, ESR3 & PTR) AND HAVE BEEN ACCOUNTED FOR IN THE QUANTITIES ON RD 2.
3. AT CONTRACTOR OPTION REPAIR TYPE ESR2/ESR3, MAY BE USED IN PLACE OF ESR/ESR1, RESPECTIVELY.
4. REPAIR TYPE WE CONSISTS OF A FULL DEPTH (TYPE FTR) x 6" DEEP EDGE OF SLAB REPAIR, WITHOUT POST-TENSION REPAIRS, AT THE EXTERIOR FACADE.

1 / R4.4 REPAIR TYPE ESR, ESR1, ESR2 & ESR3
P/T TENDON ANCHOR REPAIR & EDGE OF SLAB REPAIR

SCALE: N.T.S.

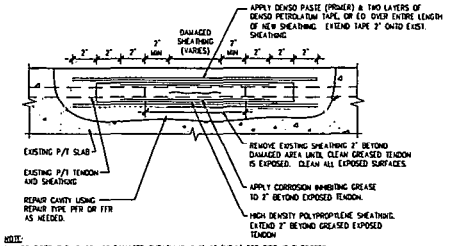


NOTES:

1. DIMENSIONS ARE FOR REFERENCE ONLY. VERIFY WITH SPLICE COUPLER MANUFACTURER.
2. COORDINATE STRESSING CRITERIA WITH ENGINEER.
3. CONTRACTOR TO SUBMIT DETENSIONING PROCEDURE TO ENGINEER FOR APPROVAL AS REQUIRED.
4. CONTRACTOR TO MAINTAIN EXISTING P/T DRAPE DURING THE RETENSIONING PROCESS.
5. INCLUDE 12 LF OF NEW TENDON PER REPAIR.

2 / R4.4 REPAIR TYPE PTR
P/T TENDON SPLICE REPAIR

SCALE: N.T.S.



NOTE:

1. CONSIDER THE LENGTH OF DAMAGED SHEATHING IS 3'-0" (NOM.) FOR BIDDING PURPOSES.

3 / R4.4 REPAIR TYPE PTS
P/T TENDON SHEATHING REPAIR (ANCILLARY WORK TO P/T REPAIRS)

SCALE: N.T.S.

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PROJECT NO.
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PROJECT

GREENWICH TOWN HALL PARKING GARAGE

2019 RESTORATION

GREENWICH, CT

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DATE: 09/27/2019

SHEET TITLE:
REPAIR DETAILS

SHEET NO
R4.4