



**DALLAS COUNTY
PURCHASING DEPARTMENT**

Records Building, 500 Elm Street, Suite 5500
Dallas, Texas 75202

**Michael Frosch
Purchasing Director**

June 25, 2025

**ADDENDUM #6
IFB 2025-036-7061 STRUCTURAL REPAIRS FOR FOUR DALLAS COUNTY BUILDINGS**

Whereas,

By way of this addendum, the following changes have been made to the solicitation:

Amended drawings and specifications for the following locations reflect the most recent updates received after the site visits are attached:

- Franck Crowley Court Building
- George Allen Courts Building

Whereas,

Except as provided herein/above, all other specification requirements of the original solicitation referenced shall remain unchanged in full force and effect. This addendum should be signed and returned with your Solicitation package on or before 7/10/2025, @ 2:00 p.m. (CST).

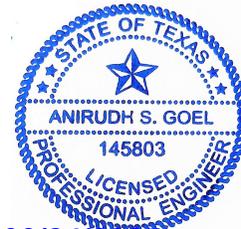


WALKER
CONSULTANTS

SPECIFICATIONS
FOR

**George Allen Courthouse
Building Repairs 2024**

Dallas, Texas



03/24/2025

ISSUED FOR BIDDING
March 24, 2025

PROJECT NO. 27-001211.01

ADDENDUM- 3
06/12/2025



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GEORGE ALLEN COURTHOUSE

Building Repairs

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March 24, 2025

Issued for Bidding

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END OF SECTION 00 01 15

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SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS

10.1 PROJECT IDENTIFICATION AND DEFINITIONS

- A. Owner will receive sealed Bids for: [George Allen Courthouse Building Repairs](#)
- B. Owner is: [Dallas County](#)
- C. Engineer/Architect is: [WALKER Consultants](#). Address: [12377 Merit Drive, Suite 420, Dallas, TX 75251](#)
- D. Project consists of providing all materials, labor, equipment, supervision, and services required to perform repairs in the George Allen [Courthouse Building](#) in accordance with the Contract Documents.
- E. Bids will be received for single contract.

10.2 DOCUMENTS

- A. Contract between Owner and Contractor: Contract Documents listed in Agreement. Also see Section "Agreement Form."
- B. Contract Documents may be examined by the Owner and/or the Engineer.
- C. Complete sets of Bidding Documents shall be used in preparing Bids. Neither Owner nor Engineer/Architect assume any responsibility for errors or misinterpretations resulting from use of incomplete sets of Bidding Documents.
- D. Owner and Engineer/Architect in making copies of Bidding Documents available on above terms do so only for purpose of obtaining Bids on Work and do not confer license or grant for any other use.

10.3 MINIMUM QUALIFICATIONS OF BIDDERS

- A. Owner may make such investigation as it deems necessary to determine ability of Bidder to perform Work, and Bidder shall furnish to Owner all such information and data for this purpose as Owner may request. Owner reserves right to reject any Bid if evidence submitted by, or investigation of, such Bidder fails to satisfy Owner that such Bidder is properly qualified to carry out obligations of Contract and to complete Work contemplated therein. Conditional Bids and voluntary alternates will not be accepted.
- B. Bidding firms will not be considered qualified if:
 - 1. Firm, or principals thereof, have defaulted on any contract, bid or bond within preceding 36 months, or;
 - 2. Firm has had no previous experience in performance of Work being bid, or;

3. Firm, as name entitled, has not been in operation in this type of Work for period of 24 months prior to this bid date, or;
4. Firm has not been awarded any prior contracts of similar amount and kind, or;
5. Firm, or principals thereof, have failed in faithful performance during warranty or guarantee period on previous Work.
6. Firm is found to have misstated or omitted any material fact in this prequalification statement.

C. Minimum Qualifications

1. Comprehensive financial statement showing current balance of unencumbered net worth equal to at least 10% of value of anticipated bid price.
2. Comprehensive list of personnel and equipment available for performance of Work to be bid.
3. Complete list of all contract work performed, or under construction if contract(s) awarded within previous 5 yr period prior to bidding.
4. See Structural Restoration Contractor's Qualification Statement section for additional requested information and submittal forms.

10.4 EXAMINATION OF CONTRACT DOCUMENTS AND SITE

- A. Bidders shall carefully examine contract documents and site to obtain first-hand knowledge of existing conditions. No subsequent extras will be allowed due to any claim of lack of knowledge for conditions which can be determined by examining site and contract documents.
- B. Extent of repairs is approximately represented on Drawings. Actual locations and extent of repair may deviate from that represented on Drawings based on field conditions.
- C. Submission of Bid shall constitute warranty that:
 1. Bidder and all Subcontractors it intends to use have carefully and thoroughly reviewed Contract Documents and have found them complete and free from ambiguities and sufficient for purposes intended; further that,
 2. Bidder and all workers, employees and Subcontractors it intends to use are skilled and experienced in type of construction represented by Contract Documents bid upon; further that,
 3. Neither Bidder nor any of its employees, agents, suppliers or Subcontractors have relied on any verbal representations from Owner, Engineer/Architect, or any of their employees, agents, or consultant, in assembling Bid figure; and further that,
 4. Bid figure is based solely on Contract Documents, including properly issued written addenda, and not upon any other written representation.
 5. Reference is made to Supplementary Conditions for identification of those reports of investigations and tests of subsurface and latent physical conditions at site or otherwise affecting cost, progress or performance of Work which have been relied upon by Engineer/Architect in preparing Drawings and Specifications. These reports are not guaranteed as to accuracy or completeness, nor are they

part of Contract Documents. Before submitting its Bid, each bidder may, at its own expense, make such additional investigations and tests as it may deem necessary to determine its Bid for performance of Work in accordance with time, price and other terms and conditions of Contract Documents.

- D. Bidder shall identify, prior to bid, all errors and/or discrepancies in Contract Documents that would be apparent to reasonably diligent Bidder. In no case shall Bidder, if selected as Contractor, be permitted any extra amount of time or money to complete project, or expenses incurred as result of such errors or discrepancies.

10.5 RESOLUTION OF DISCREPANCIES AND AMBIGUITIES

Refer to Dallas County front end Documents.

10.6 SUBSTITUTED MATERIAL AND EQUIPMENT

- A. Contract, if awarded, will be on basis of material and equipment described in Drawings or specified in Specifications without consideration of possible substitute or "or-equal" items. Whenever it is indicated in Drawings or specified in the Specifications that substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Engineer/Architect, application for such acceptance will not be considered by Engineer/Architect until after "effective date of Agreement."
- B. List of substitutions for products or materials specified for Project must be submitted with the completed bid.

10.7 BASIS FOR BIDS

- A. Bids are based on lump sum contract at unit prices. Work Item quantities are based on Engineer/Architect's estimates.
- B. Bids are based on lump sum contract.

10.8 PREPARATION OF BIDS

Refer to Dallas County front end Documents.

10.9 BID SECURITY

Refer to Dallas County front end Documents.

10.10 PERFORMANCE BOND, LABOR AND MATERIAL PAYMENT BOND AND INSURANCE

Refer to Dallas County front end Documents.

10.11 SUBCONTRACTOR LISTING

- A. If Supplementary Conditions require identity of certain Subcontractors and other persons and organizations to be submitted to Owner in advance of Notice of Award, apparent successful Bidder, and any other Bidder so requested, shall within seven days after day of Bid opening submit to Owner list of all Subcontractors and other persons and organizations (including those who are to furnish principal items of material and equipment) requested/suggested for those portions of Work as to which such identification is so required. Such list shall be accompanied by experience statement with pertinent information as to similar projects and other evidence of qualification for each such Subcontractor, person and organization if requested by Owner.
- B. If Owner or Engineer/Architect after due investigation has reasonable objection to any Subcontractor, other person or organization, either may request apparent Successful Bidder to submit acceptable substitute before giving Notice of Award. If apparent successful Bidder declines to make any such substitution, contract shall not be awarded to such Bidder, but Bidder's declining to make any such substitution will not constitute grounds for sacrificing its Bid Security. Any Subcontractor, other person or organization so listed and to whom Owner or Engineer/Architect does not make written objection prior to the giving of Notice of Award will be deemed acceptable to Owner and Engineer/Architect.
- C. In contracts where Contract Price is on basis of Cost-of-the-Work Plus a Fee, apparent Successful Bidder, prior to Notice of Award, shall identify in writing to Owner those portions of Work that such Bidder intends to subcontract and after Notice of Award may only subcontract other portions of Work with Owner's written consent.
- D. No Contractor shall be required to employ any Subcontractor, other person or organization against whom it has reasonable objection.

10.12 IDENTIFICATION AND SUBMISSION OF BIDS

- A. Bids shall be submitted in duplicate at time and place indicated in Invitation to Bid and shall be placed in opaque sealed envelope, marked with Project title, and name and address of Bidder, and accompanied by Bid Security and other required documents.

10.13 MODIFICATION OR WITHDRAWAL OF BIDS

- A. Bids may be withdrawn by written or telegraphic request dispatched by Bidder in time for delivery, in normal course of business, prior to time fixed for opening of Bids, provided that written confirmation of any telegraphic withdrawal, over signature of Bidder, is placed in mail and postmarked prior to time set for opening Bids.

10.14 GOVERNING LAWS AND REGULATIONS

- A. No Contractor shall discriminate against any employee or applicant for employment, to be employed in performance of contract, with respect to their hire, tenure, terms, conditions or privileges of employment, because of their race, color, religion, gender, national origin or age pursuant to requirements of all applicable federal and state statutes.
- B. Each Bidder shall make affidavit that its Bid is genuine and not sham or collusive or made in interests or on behalf of any person not therein named and that Bidder has not directly or indirectly induced or solicited any Bidder to put in sham Bid or any other person or corporation to refrain from Bidding, and that Bidder has not in any manner sought by collusion to secure itself an advantage over other Bidders.

10.15 CONTRACT TIME

- A. Time is of essence in performance of Work under this Contract. Available time for Work under this Contract is indicated in Bid Form and will be include in executed Agreement. If these time requirements cannot be met, Bidder is requested to stipulate in Bid schedule for performance of Work. Consideration will be given to time in evaluating Bids.

10.16 PRE-BID CONFERENCE

- A. A pre-bid conference will be held as listed below.

[Date to be determined.](#)

10.17 DISQUALIFICATION OF BIDDERS

- A. In evaluating Bids after Bids are opened and prior to Award of Contract, Owner shall consider qualifications of Bidders, whether or not Bids comply with prescribed requirements, and alternates and unit prices if requested in Bid Forms.
- B. Owner may consider qualifications and experience of Subcontractors and other persons and organizations (including those who are to furnish principal items of material or equipment) submitted/recommended by Bidders for those portions of Work as to which identity of Subcontractors and other persons and organizations must be submitted. Operating costs, and maintenance considerations, performance data and guarantees of materials and equipment may also be considered by Owner.
- C. Owner may conduct such investigations as it deems necessary to assist in evaluation of any Bid and to establish responsibility, qualifications and financial ability of Bidders, Subcontractors and other persons and organizations to do Work in accordance with Contract Documents to Owner's satisfaction within prescribed time.
- D. Owner reserves right to reject Bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.

- E. Owner reserves right to disqualify Bids before or after opening, upon evidence of collusion with intent to defraud or other illegal practices upon part of Bidder.

10.18 BIDS TO REMAIN OPEN

Refer to Dallas County front end Documents.

10.19 AWARD OF CONTRACT

Refer to Dallas County front end Documents.

10.20 EXECUTION OF CONTRACT

Refer to Dallas County front end Documents.

10.21 UNIT PRICE

- A. List of Unit Prices upon forms bound with Section "List of Unit Prices" must be submitted with the completed bid.
- B. If Owner or Engineer/Architect after due investigation has reasonable objection to any unit price, either may request apparent Successful Bidder to submit acceptable revision without increase in Bid price before giving Notice of Award. If apparent Successful Bidder declines to make any such revision, Contract shall not be awarded to such Bidder, but Bidder's declining to make any such revision will not constitute grounds for sacrificing Bid Security. Any unit price so listed and to which Owner or Engineer/Architect does not make written objection prior to giving of Notice of Award will be deemed acceptable to Owner and Engineer/Architect.

10.22 CONTRACT PRICE

- A. Bids are solicited on basis of unit prices and/or lump sum prices which are to be clearly set forth in Bid Form. Final Contract price on accepted Bids will be determined by multiplying number, or fraction thereof, units of Work actually performed, or labor, material or appliances actually supplied, by price designated for such item in Bid. Total Bid figure on Bid Form is merely for purposes of estimating and comparing costs and under no circumstances on unit price contracts does it constitute or imply total Contract price.

END OF SECTION 00 21 13

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Name of Bidder _____

SECTION 00 41 00 - BID FORMS

30.1 INSTRUCTIONS

Submit Bids on this Bid Form in accordance with Instructions to Bidders.

30.2 BID FORM

PART 1 - TERMS OF BID

PROJECT IDENTIFICATION:

CONTRACT IDENTIFICATION AND NUMBER:

THIS BID IS SUBMITTED TO: [Dallas County](#)

- A. The undersigned BIDDER offers and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in form included in Contract Documents to complete all Work as specified or indicated in Contract Documents for Contract Price and within Contract Time indicated in this Bid and in accordance with Contract Documents.
- B. BIDDER accepts all of terms and conditions of Instructions to Bidders, including without limitation those dealing with disposition of Bid Security. BIDDER will sign Agreement and submit Contract Security and other documents required by Contract Documents within 15 days after date of OWNER's Notice of Award. This Bid will remain open for 60 days after day of Bid opening.
- C. In submitting this Bid, BIDDER represents, as more fully set forth in Agreement, that:
 - 1. BIDDER has examined copies of all Contract Documents and of following addenda:

Date	Number
_____	_____
_____	_____

- (receipt of all of which is hereby acknowledged) and also copies of Advertisement or Invitation to Bid or Instructions to Bidders.
- 2. BIDDER has examined site and locality where Work is to be performed, legal requirements (federal, state and local laws, ordinances, rules and regulations) and conditions affecting cost, progress or performance of Work and has made such independent investigations as BIDDER deems necessary.
- 3. This Bid is genuine and not made in interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement

Name of Bidder _____

or rules of any group, association, organization or corporation; BIDDER has not directly induced or solicited any other Bidder to submit false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER; and

4. BIDDER agrees that Work Item quantities are estimates and that OWNER may increase or decrease these quantities at unit prices stated, so long as increases or decreases in Base Bid do not exceed 25% of Base Bid price. Increases or decreases beyond these limits shall be in accordance with Supplementary Conditions, Division 00.
5. BIDDER agrees that all alterations or additions to Work shall be performed in accordance with paragraph "Changes" and/or "Construction Change Directives" under Section "Supplementary Conditions."
6. OWNER reserves right to delete any Section of Work.

- D. BIDDER agrees that Work shall be substantially completed and fully completed on or before dates or within number of calendar days indicated in Agreement.

shall be substantially completed on or before
_____, 20 _____

and fully completed by
_____, 20 _____

shall be substantially completed within ____ calendar days after date when Contract Time commences to run, and fully completed within ____ calendar days after date when Contract Time commences to run.

BIDDER accepts provisions of Agreement as to liquidated damages in event of failure to complete Work on time.

- E. BIDDER will complete Work for following price(s)

LUMP SUM CONTRACT PRICE _____
(use words)

_____ DOLLARS \$ _____
(figures)

- F. BIDDER will complete Work for the prices shown in Section "List of Unit Prices."

Name of Bidder _____

- G. Communications concerning this Bid shall be addressed to: (BIDDER to provide bidder's name, address, telephone number and name of individual familiar with this Bid and able and authorized to answer questions regarding this Bid.)

- H. Terms used in this Bid which are defined in General Conditions of Construction Contract included as part of Contract Documents have meanings assigned to them in General Conditions.

SUBMITTED ON _____, 20 _____

PART 2 - MATERIAL AND EQUIPMENT ALTERNATES

Base Bid price shall include materials and equipment selected from designated items and manufacturers listed. The purpose of this requirement is to establish uniformity in bidding and to establish standards of quality for items named.

If BIDDER wishes to quote alternate items for consideration by Owner, it may do so under this Section. Complete description of item and the price differential must be provided. Unless approved at time of award, substitutions where items are specifically named will be considered only as negotiated change in Contract Sum.

<u>WORK ITEM</u>	<u>DESCRIPTION OF ALTERNATE ITEM(S)</u>	<u>ADD/DEDUCT AMOUNT</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Name of Bidder _____

PART 3 - TIME ALTERNATE

If BIDDER takes exception to time stipulated in Part 1, Terms of Bid, it shall stipulate below its suggested time for performance of Work. Consideration will be given to time in evaluating Bids.

BIDDER agrees that Work shall be substantially completed within ____ calendar days after date when Contract Time commences to run, and fully completed within ____ calendar days after date when Contract Time commences to run.

PART 4 - ATTACHMENTS

Following documents are attached to and made condition of this Bid, unless noted otherwise:

- A. Required Bid Security in form of:
- B. Substitution listing per the requirements of the Instructions to Bidders within 7 days after the day of the Bid opening.
- C. Equipment Suppliers' Listing.
- D. List of alternates/alternatives.
- E. List of Unit Prices.
- F. Non-Collusion Affidavit.
- G. A list of Subcontractors and other persons and organizations required to be identified, if so requested, per the requirements of the Instructions to Bidders within 7 days after the day of the Bid opening.
- H. Required Bidders Qualification Statement for Structural Restoration Work with supporting data per requirements of Instructions to Bidders within 7 days after day of Bid opening. Use form attached to Section "Instructions to Bidders." Copies of previously prepared statements on this form which are less than 12 months old will be acceptable.

Name of Bidder _____

PART 5 - SIGNATURES

If BIDDER is:

An Individual

By _____ (SEAL)
(Individual's Name)

doing business as _____

Business Address: _____

Phone Number: _____

A Partnership

By _____ (SEAL)
(Firm Name)

_____ (General Partner)

_____ (General Partner)

Business Address: _____

Phone Number: _____

Name of Bidder _____

A Corporation

By _____
(Corporation Name)

(State of Incorporation)

By _____
(Name of Person Authorized to Sign)

(Title)

(Corporate Seal)

Attest _____
(Secretary)

Business Address: _____

Phone Number: _____

A Joint Venture

By _____
(Name)

(Address)

By _____
(Name)

(Address)

Each joint venture member must sign. The manner of signing for each individual partnership and corporation that is party to joint venture should be in manner indicated above.

END OF SECTION 00 41 00

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SECTION 00 43 10 – PROCUREMENT FORM SUPPLEMENTS-RESTORATION

1.1 CONSTRUCTION PHASING, SEQUENCING AND WORK HOURS

- A. Owner will continue to use the structure during restoration. Contractor must phase and arrange work to maintain access at all times to all areas that are not under construction.
- B. Contractor should coordinate with the owner to limit the construction inconveniences and for optimal use of the property.
- C. Work hours are 7 am - 4 pm, Monday - Friday. The contractor shall verify work hours with the owner. Contractor shall coordinate off-hours, weekend, and holiday work with the owner at least 72 hours in advance.

1.2 LIST OF ALTERNATES

- A. This Section identifies potential changes in the work under consideration for this contract. The Owner reserves the right to accept any or all of the listed Alternates, regardless of the order of their listing.
- B. For each of the Alternates listed below, state the total amount to be added to, or deducted from, the total contract amount if the individual Alternate is selected for inclusion in the contract scope. Amount shown shall include all costs to perform the Work, no extras will be permitted for failure to consider such items as extra permits, overtime, weather protection, etc.

1. Night work:

State added cost (and percentage) to perform all work shown between the hours of 8:00 PM and 5:00 AM Sunday night through Friday morning. If only portions of the Work are selected to be performed during these hours, the added percentage shown will be applied to the Work Items affected.

(____%) _____ Dollars. (in words)
(\$_____) (numbers)

2. Weekend Work:

State added cost (and percentage) to perform all work show between the hours of 8:00 PM Friday through 8:00 PM Sunday. If only portions of the Work are selected to be performed during these hours, the added percentage shown will be applied to the Work Items affected.

(____%) _____ Dollars (in words)
(\$_____) (numbers)

3. Painting Ceilings:

State added cost to paint all ceilings on Level. Refer to Division 09, Section for Painting for Materials and Other Requirements.

_____ Dollars (in words)
(\$ _____) (numbers)

_____ Dollars (in words)
(\$ _____) (numbers)

1.3 UNIT PRICES

- A. The quantities given in Section 1.4 table shall be used for the bid award. Provide unit prices in Section 1.4 table. Change Orders shall be used if excess quantities than shown in Section 1.4 table are found. Procedures for submitting and handling Change Orders are included in Division 01 Section "Contract Modification Procedures.

1.4 LIST OF UNIT PRICES

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
3.0	CONCRETE FLOOR REPAIR				
3.1	Floor Repair - Partial Depth/Shallow	S.F.	80		\$
4.0	CONCRETE CEILING REPAIR				
4.1	Ceiling - Partial Depth/Shallow	S.F.	50		\$
4.3	Glass FRP Mount and Splice/Gap	L.F.	50		\$
5.0	CONCRETE BEAM REPAIR				
5.7	Joist Repair - Partial Depth/Shallow	S.F.	30		\$
6.0	COLUMN REPAIR				
6.1	Column Repair - Partial Depth/Shallow	S.F.	10		\$
7.0	CONCRETE WALL REPAIR				
7.1	Wall Repair - Partial Depth/Shallow	S.F.	60		\$
PART IV: CRACKS AND JOINTS					
11.0	CRACK AND JOINT REPAIR				
11.1	Rout and Seal Cracks	L.F.	600		\$
11.5	Crack Repair-Epoxy Injection	L.F.	150		\$
11.6	Chemical Grout Injection	L.F.	100		\$
PART V: FLOOR SURFACE PROTECTION					
16.0	TRAFFIC TOPPING				
16.1	Traffic Topping- Vehicular/Recoat	S.F.	5500		\$
PART VII: MECHANICAL/ELECTRICAL SYSTEMS					
25.0	MECHANICAL-DRAINAGE				
25.8	Replace Broken Drain Grating	E.A.	10		\$
25.9	Floor Repair at Floor Drain	S.F.	10		\$
26.0	MECHANICAL-FIREPROTECTION				
26.6	Fireproofing Replacement	L.F.	50		\$
26.7	Remove Exist. Fireproofing, Remove Corrosion, Paint with Corrosion Inhibitive Coating, and Reapply Fireproofing	L.F.	50		\$
PART VIII: ARCHITECTURAL REPAIRS					
35.0	RESERVED FOR NONSTANDARD WORK				
35.1	CMU Tuckpointing	L.F.	100		\$
35.2	Masonry Unit Repair/Replacement	E.A.	10		\$
PART IX: METAL WORK					
40.0	CONNECTIONS/ BEARINGS				
40.7	Replace Fasteners Exhibiting Corrosion	E.A.	10		\$
40.8	Remove Rust and Paint Stair Landing with Corrosion Inhibitor	S.F.	20		\$
40.9	Abrasively Blast and Recoat Structural Steel Exhibiting Corrosion	S.F.	10		\$
100.0	Additional Identified Costs (To be listed by Contractor)				
GRAND TOTAL					\$

3

L.F. = Lineal Feet
 EA = Each
 S.F. = Square Feet
 L.S. = Lump Sum

1.5 RESPONSIVE BIDDERS

To be considered a responsive bidder all line items above need to be entered with an amount (even if it is \$0.00) including Unit Pricing

*Contingency is a quantity of work or dollar amount established in addition to the quantities given the above table. To adjust quantities, prepare a Change Order bid based on the difference between purchase amount and the additional quantities. Obtain Engineer's and Dallas County approvals before starting additional work.

1.6 NON-COLLUSION AFFIDAVIT

Bidder, by its officers and its agents or representatives present at the time of filing this Bid, being duly sworn on their oaths say, that neither they nor any of them have in any way, directly or indirectly, entered into any arrangement or agreement with any other Bidder, or with any officer of CLIENT whereby such affiant or affiants or either of them has paid or is to pay such other Bidder or officer any sum of money, or has given or is to give to such other Bidder or officer anything of value whatever, or such affiant or affiants or either of them has not directly or indirectly, entered into any arrangement or agreement with any other free competition into the letting of the contract sought for by the attached Bids that no inducement of any form or character other than that which appears on the face of the Bid will be suggested, offered, paid or delivered to any person whomsoever to influence the acceptance of the Bid or awarding of the Contract, nor has this Bidder any agreement or understanding of any kind whatsoever, with any person whomsoever to pay, deliver to, or share with any other person in any way or manner, any of the proceeds of the Contractor sought by this Bid.

Submitted By:

Type or print firm name:

Authorized Signature:

Date:

1.7 LIST OF SUBCONTRACTORS

	COMPANY ADDRESS	CONTACT PERSON NAME PHONE NUMBER FAX NUMBER
Demolition	_____ _____ _____	_____ _____ _____
Landscaping	_____ _____ _____	_____ _____ _____
Paving	_____ _____ _____	_____ _____ _____
Ready-Mix Concrete	_____ _____ _____	_____ _____ _____
Concrete Reinforcement	_____ _____ _____	_____ _____ _____
Masonry	_____ _____ _____	_____ _____ _____
Protective Sealer	_____ _____ _____	_____ _____ _____
Traffic Topping	_____ _____ _____	_____ _____ _____
Expansion Joints	_____ _____ _____	_____ _____ _____
Sealants and Caulking	_____ _____	_____ _____

	COMPANY ADDRESS	CONTACT PERSON NAME PHONE NUMBER FAX NUMBER
Control Joint Sealant	_____	_____
	_____	_____
	_____	_____
Cove Sealant	_____	_____
	_____	_____
	_____	_____
Doors and Windows	_____	_____
	_____	_____
	_____	_____
Graphics	_____	_____
	_____	_____
	_____	_____
Plumbing	_____	_____
	_____	_____
	_____	_____
Fire Protection	_____	_____
	_____	_____
	_____	_____
HVAC	_____	_____
	_____	_____
	_____	_____
Electrical	_____	_____
	_____	_____
	_____	_____

END OF SECTION 00 43 10

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SECTION 00 45 13 – BIDDER’S QUALIFICATION STATEMENT - STRUCTURAL RESTORATION WORK

This statement is required in advance of consideration of application to bid or as a qualification statement in advance of a restoration contract.

SUBMITTED TO: Dallas County Facility Management
133 N. Riverfront Blvd. 9th Floor.
Dallas, TX 75207
Kumar Pilla

Attn: _____

SUBMITTED BY: _____

ADDRESS: _____

PHONE: (____) _____

CONTACT: _____

COMPANY STRUCTURE:

- Corporation
- Partnership
- Individual
- Joint Venture
- Other (Explain)

SPECIAL CERTIFICATIONS:

- MBE
- WBE
- Other (Explain): _____

SUBMITTAL DATE: _____

AREA(S) OF EXPERTISE: (Check all that apply)

- | | | |
|--|--------------------------|------------------------|
| <input type="checkbox"/> EIFS Repair | <input type="checkbox"/> | Concrete/Steel Repairs |
| <input type="checkbox"/> Waterproofing/Jts. & Sealants | <input type="checkbox"/> | Brick/Masonry |
| <input type="checkbox"/> Waterproofing/ Sealers | <input type="checkbox"/> | Historic Buildings |
| <input type="checkbox"/> Waterproofing/Roofing | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> Waterproofing/Plaza Systems | <input type="checkbox"/> | _____ |

STRUCTURAL RESTORATION CONTRACTOR'S QUALIFICATION QUESTIONNAIRE

1. How many years has your organization been in business as a structural restoration contractor? _____ Starting Year: _____
2. How many years has your organization been in business as a general contractor?
_____ Starting Year: _____
3. How many years has your organization been in business under its present business name?
_____ Starting Year: _____
4. List states in which your organization is legally qualified to do business.
5. What percentage of the work do you normally perform with your own work forces?
6. List on **Table I** the last five structural restoration projects your firm has completed.
7. List on **Table II** the structural restoration projects your organization has in progress at this time.
8. Have you ever failed to complete any work awarded to you? If so, attach a separate sheet of explanation.
9. Has any officer or partner of your organization ever been an officer or partner of another organization that failed to complete a construction contract? If so, attach a separate sheet of explanation.
10. List on **Table III** the construction experience of the principals and superintendents of your company.
11. What is your present bonding capacity? \$ _____ per Project,
\$ _____ Aggregate
12. Who is your bonding agent?
NAME: _____
ADDRESS: _____
PHONE: (_____) _____
CONTACT: _____
13. Are you rated by any State Highway Departments? If so, please list which states on **Table IV** and your company's rating.
14. List on **Table V** the equipment you own that is available for restoration work.
15. Are there any liens against the above? _____ If so, total amount \$ _____

GEORGE ALLEN COURTHOUSE

Building Repairs

Walker Project No. 27-001211.01

Construction Documents

March 24, 2025

Issued for Bidding

16. Attach your company's most recent audited Balance Sheet, prepared in accordance with generally accepted accounting principles.

Date of Balance Sheet: _____

Name of firm Balance Sheet: _____

DATED AT _____ THIS _____ DAY OF _____, 20____.

Name of Organization: _____

By: _____

TITLE: _____

STATE OF: _____

COUNTY OF: _____

_____ being duly sworn, deposes and says that he/she is _____ of the above organization and that the answers to the questions in the foregoing questionnaire and all statements therein contained are true and correct.

SUBSCRIBING AND SWORN TO BEFORE ME THIS _____ DAY OF _____ 20____.

NOTARY PUBLIC: _____

MY COMMISSION EXPIRES: _____

TABLE I - LAST FIVE RESTORATION JOBS COMPLETED			
Name and Address of Contractor			Date:
Name and Address of Owner	Type of Restoration Work	Contract Amount	Date Completed

TABLE II - LIST OF STRUCTURAL RESTORATION IN PROGRESS

Name and Address of Contractor			Date:
Name and Address of Owner	Type of Work	Contract Amount	Expected Completion Date

TABLE III - CONSTRUCTION EXPERIENCE OF PRINCIPALS AND SUPERINTENDENTS

Name and address of Contractor:					Date:
Name	Position	Years Experience		Type of Work	Contract Amount
		Construction	Restoration		

GEORGE ALLEN COURTHOUSE
Building Repairs
Walker Project No. 27-001211.01

Construction Documents
March 24, 2025
Issued for Bidding

TABLE IV - RATINGS BY STATE HIGHWAY DEPARTMENTS			
Name and address of Contractor:			Date:
State	Rating	Contact & Phone No.	Highway Jobs for Ea. State

TABLE V - LIST OF EQUIPMENT

TABLE V - LIST OF EQUIPMENT			
Name and address of Contractor:			Date:
Description of Equipment	Quantity	Years of Service	Current Book Value

END OF SECTION 00 45 13

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SECTION 01 11 10 - SUMMARY OF WORK - RESTORATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 PROJECT DESCRIPTION

- A. Work consists of repairs for the structure.
 - 1. Partial depth repair of soffit, floor, beams, and columns.
 - 2. Rout and Seal Cracks
 - 3. Crack Repair- Epoxy Injection
 - 4. Crack Repair- Chemical Grout Injection
 - 5. Traffic Topping- Vehicular/Recoat
 - 6. Replace Broken Drain Grating
 - 7. Floor Repair at Floor Drain
 - 8. Replace Damaged Fireproofing
 - 9. Remove Exist. Fireproofing, Remove Corrosion, Paint with Corrosion Inhibitive Coating, and reapply Fireproofing
 - 10. Tuckpointing and repair all damaged CMU blocks.
 - 11. Remove Rust and Paint Stair Landing with Corrosion Inhibitor
- B. Work will be performed at locations within structure as shown on Drawings.
- C. Work required in these areas and estimated quantities are listed on Bid Form. Bid Quantities associated with Work Items listed on Drawings have been estimated and are subject to measurement as defined in Article "Measurements." Where additional Work Items are described, but not specifically located and/or shown on Drawings, Contractor shall be responsible for locating and marking areas to be repaired. Owner and/or Engineer/Architect reserves right to increase or decrease quantities up to 25% at same unit cost, as required by job conditions. Unit costs will be brought to notice of Engineer for quantity variations exceeding 25%.

- D. Work Item specifications and details shall govern all repair operations. Locations where Work Items apply are shown on Drawings as symbols.
- E. Final payment shall be made on basis of actual approved Work performed as measured in place.
- F. Project comprises of [George Allen Courthouse Building Repairs located at 600 Commerce Street, Dallas, Texas 75202.](#)

1.3 MEASUREMENTS

- A. Before ordering any material or doing any Work, Contractor shall verify all measurements at Project site and shall be responsible for correctness of same.
- B. Before proceeding with each Work Item, Contractor shall locate, mark, and measure quantity of each item and report quantities to Engineer/Architect. If measured quantities exceed Engineer/Architect's estimate, Contractor shall obtain written authorization to proceed from Owner before executing Work required for that Work Item.
- C. Measurement of quantities for individual Work Items will be performed by Contractor and reviewed by Engineer/Architect. Coordinate measurements with inspection as required in Section "Project Management and Coordination."
- D. Cost of Work included in each Work Item for quantities as indicated in Contract Documents shall be included in Base Bid.
 - 1. Additions to or deductions from lump sum price for quantities of each Work Item added to or deducted from Work respectively shall be at unit prices indicated in Bid Form and shall constitute payment or deductions in full for all material, equipment, labor, supervision and incidentals necessary to complete Work.

1.4 WORK UNDER OTHER CONTRACTS

- A. Separate contract has been issued to ABC Construction Co. to perform certain construction operations at site. Those operations precede and are scheduled to be substantially completed prior to construction operations under this Contract. That contract includes:
 - 1. Paved access roads and associated site construction.
 - 2. Underground power cable, telephone cable, and gas line to site.
 - 3. Water well and temporary water service.

1.5 WORK SEQUENCE

- A. Prior to commencement of work, meet with Engineer/Architect and Owner representatives to establish sequence and schedule of Work. Contractor shall give

Owner notice of areas to be cleared of cars at least 2 working days in advance of actual Work.

- B. Contractor shall notify Owner's representative at least 24 hr prior to beginning any abrasive blasting operations.
- C. Contractor shall remove all broken concrete and debris from Work area on daily basis and dispose of same at authorized dump sites.
- D. Contractor shall remove dust and air transported sand/debris from remainder of facility at conclusion of operations in Work area.

1.6 CONTRACTOR USE OF PREMISES

- A. General: During construction period Contractor shall have full use of premises for construction operations, including use of site. Contractor's use of premises is limited only by Owner's right to perform construction operations with its own forces or to employ separate contractors on portions of project.
- B. General: Limit use of premises to construction activities in areas indicated; allow for Owner occupancy and use by public.
 - 1. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.
 - 2. Keep driveways and entrances serving the premises clear and available to the Owner and Owner's employees at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
 - 3. Burial of Waste Materials: Prior to final grading and landscape development, existing grade depression near the southwest corner of site, as indicated, may be used for disposal of inert waste material from construction process. Do not dispose of organic and hazardous material on site, either by burial or by burning.
- C. Contractor's use of premises shall not interfere with operation of same. Elevators shall not be used for transfer of materials or equipment.
- D. Contractor's debris removal path shall be over non-repaired services unless physical restraints prevent use of such path.
- E. Contractor shall confine its apparatus, materials, equipment, tool cribs, field offices and operations to areas designated by Owner and/or Engineer/Architect. Premises shall not be unreasonably encumbered with materials and equipment. Neat and orderly stockpiling and other operations shall be maintained and debris shall be regularly removed from site. Contractor shall not load or permit any part of structure to be loaded with weight that will endanger structural integrity or safety of facility.
- F. Contractor Parking: Contractor's employees shall park within confines of work area or pay prevailing parking rates. Contractor shall confirm with owner for parking.

- G. On-Site Storage: Contractor shall not store materials or equipment at site of Work for more than one week prior to time that materials or equipment are incorporated into Work.

1.7 BARRICADES

- A. Provide positive barricading to separate Work areas from areas open to public and to prevent the need for washing cars parked adjacent to the work area. Minimum acceptable separation: 4 ft. 0 in. high solid temporary barrier constructed of wood or concrete. Provide additional barriers as required to prevent damage to vehicle due to airborne debris. See "Temporary Facilities" for additional requirements.

1.8 TRAFFIC OFFICERS AND FLAGMEN

- A. When, in Owner's opinion, it is necessary that uniformed police or security officers be used to protect and control pedestrian traffic, to direct vehicular traffic during construction and to keep traffic off any part of Work, or to protect public safety, a police/security detail will be obtained. All expenses for uniformed officers shall be assumed by Contractor and included in bid price or in prices bid for items of Work to be performed under this Contract.

1.9 CLAIMS

- A. Contractor shall promptly address all damages claims. Owner reserves right to resolve any claims not addressed by Contractor within 3 wks after claim is received by Contractor. Any amounts paid by Owner will be deducted from Contractor's next progress payment.

1.10 OWNER OCCUPANCY (NOT APPLICABLE)

1.11 PRE-ORDERED PRODUCTS (NOT APPLICABLE)

1.12 OWNER-FURNISHED ITEMS (NOT APPLICABLE)

1.13 MISCELLANEOUS PROVISIONS (NOT APPLICABLE)

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 SCHEDULE OF PRE-ORDERED PRODUCTS – NOT USED

END OF SECTION 01 11 10

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SECTION 012100 – ALLOWANCES

PART 1 - GENERALS

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements governing handling and processing allowances.
 - 1. Selected materials and equipment, and in some cases, their installation are shown and specified in 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. Additional requirements, if necessary, will be issued by Change Order.
- B. Types of allowances required include following:
 - 1. Lump-sum allowances.
- C. Procedures for submitting and handling Change Orders are included in Division 01 Section "Contract Modification Procedures."

1.3 DEFINITIONS

- A. Allowance is a quantity of work or dollar amount established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.4 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Engineer of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.
- B. At Engineer's request, obtain bids for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Engineer from the designated supplier.

1.5 QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Engineer under allowance and shall include taxes, freight and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Engineer under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.6 SUBMITTALS

- A. Submit bids for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to indicate actual quantities of materials delivered to site for use in fulfillment of each allowance.
- C. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- D. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.7 LUMP-SUM ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Engineer under allowance and shall include taxes, freight and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Engineer/Engineer under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.8 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order bid based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.

2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
 3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.9 UNUSED MATERIALS

- A. Return unused materials to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
- B. Where it is not economically feasible to return unused material for credit and when requested by Engineer/Engineer, prepare unused material for Owner's storage, and deliver to Owner's storage space as directed. Otherwise, disposal of excess material is Contractor's responsibility.

PART 2 - PRODUCTS (NOT APPLICABLE)

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. Inspect products covered by an allowance promptly upon delivery for damage or defects.

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 construction activities.

3.3 SCHEDULE OF ALLOWANCES

- A. For allowances associated with the project, refer to Section 004310 "Procurement Form Supplements – Restoration."

END OF SECTION 012100

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SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing contract modifications.
- B. Related Requirements:
 - 1. Division 01 Section "Submittal Procedures" for requirements for Contractor's Construction Schedule.
 - 2. Division 01 Section "Payment Procedures" for administrative procedures governing applications for payment.

1.3 MINOR CHANGES IN THE WORK

- A. Engineer will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

1.4 BID REQUESTS

- A. Owner-Initiated Bid Requests: Changes in Work that will require adjustment to Contract Sum or Contract Time will be issued by Engineer, with detailed description of change and supplemental or revised Drawings and Specifications, if necessary.
 - 1. Work Change Bid Requests issued by Engineer are not instructions either to stop work in progress or to execute the work change.
 - 2. Within time specified in Bid Request or 20 days, when not otherwise specified, after receipt of Bid Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.

- d. Include statement indicating effect change in Work will have on Contract Time.
- B. Contractor-Initiated Change Order Bid Requests: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Engineer.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the Contractor-requested change. Indicate the effect of the Contractor-requested change on the Contract Sum and the Contract Time.
 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Include costs of labor and supervision directly attributable to the change.
 5. Submit request no later than 10 working days after discovery of condition.
 6. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 7. Comply with requirements in Division 01, Section "Contract Modification Procedures" if the Contractor-requested change requires substitution of one product or system for product or system specified.
- C. Bid Request Form: Use AIA Document G709 or form acceptable to Engineer.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Bid Request, Construction Manager will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Engineer may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.7 WORK CHANGE DIRECTIVE

- A. Work Change Directive: Engineer may issue a Work Change Directive on EJCDC Document C-940. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 26 00

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SECTION 01 29 00 - 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 01 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 Requirements:
 - 1. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Division 01 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

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.
 - 1. Correlate line items in the Schedule of Values with items required to be indicated as separate activities in Contractor's construction schedule, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - c. Submit preliminary SOV to Owner prior to construction and Notice to Proceed.
 - 2. After Notice to Proceed, submit the Schedule of Values to Engineer and Owner at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

3. Sub-schedules: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules 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 Engineer.
 - c. Engineer's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 2. 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. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 3. 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 in excess of five percent of the Contract Sum.
 4. 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. Include evidence of insurance or bonded warehousing if required.
 5. 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.
 6. Overhead Costs: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
 7. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.

8. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Engineer and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
 1. Submit draft copy of Application for Payment seven days prior to due date for review by Engineer.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 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. Engineer 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.
 3. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.

- c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Engineer 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.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities 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 conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Waiver Delays: Submit each Application for Payment with Contractor's waiver of mechanic's lien for construction period covered by the application.
 - a. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- H. 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.
 14. Performance and payment bonds.
 15. Data needed to acquire Owner's insurance.
 16. Initial settlement survey and damage report if required.

- I. 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.

- J. 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. AIA Document G707, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. 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.
 9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 29 00

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SECTION 01 31 00 - 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 01 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. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Project meetings.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Construction Progress Documentation" for preparing and submitting the Contractor's Construction Schedule.
 - 2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 01 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, Engineer, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms suggested by Contractor for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, telephone number, and email address 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.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
1. Post copies of list in project meeting room, in temporary field office and in prominent location in built facility. Keep list current at all times.

1.5 COORDINATION

- A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
- B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each 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 with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- C. If necessary, 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.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled 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.
- E. 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.

1.6 SUBMITTALS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - e. Indicate required installation sequences.
 - f. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Engineer indicating suggested resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 2. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.

3. Review: Engineer will review coordination drawings to confirm that in general the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Engineer determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Engineer will so inform Contractor, who shall make suitable modifications and resubmit.
 4. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Division 01, Section "Submittal Procedures."
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
 2. File Preparation Format: DWG Version operating in Microsoft Windows operating system.
 3. File Submittal Format: Submit or post coordination drawing files PDF format.

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Engineer will return without response those RFIs submitted to Engineer by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Engineer.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

- a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Engineer.
1. Attachments shall be electronic files in PDF format.
- D. Engineer's Action: Engineer will review each RFI, determine action required, and respond. Allow seven working days for Engineer's response for each RFI. RFIs received by Engineer after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Engineer's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Engineer's action may include a request for additional information, in which case Engineer's time for response will date from time of receipt by Engineer of additional information.
 3. Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Bid according to Division 01, Section "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log bi-weekly. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Engineer.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Engineer's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Bid Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Bid Request, as appropriate.

- F. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within seven days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Engineer's Data Files Not Available: Engineer will not provide Engineer's CAD drawing digital data files for Contractor's use during construction.
- B. PDF Document Preparation: Where PDFs are required to be submitted to Engineer, prepare as follows:
 - 1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 - 2. Name file with submittal number or other unique identifier, including revision identifier.
 - 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 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 Engineer of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Engineer, within three days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Engineer, but no later than 15 days after execution of the Agreement.
 - 1. Attendees: Authorized representatives of Owner, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. 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. Responsibilities and personnel assignments.

- b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.
 - h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Sustainable design requirements.
 - o. Preparation of Record Documents.
 - p. Use of the premises and existing building.
 - q. Work restrictions.
 - r. Working hours.
 - s. Owner's occupancy requirements.
 - t. Responsibility for temporary facilities and controls.
 - u. Procedures for moisture and mold control.
 - v. Procedures for disruptions and shutdowns.
 - w. Construction waste management and recycling.
 - x. Parking availability.
 - y. Office, work, and storage areas.
 - z. Equipment deliveries and priorities.
 - aa. First aid.
 - bb. Security.
 - cc. Progress cleaning.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for 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 Engineer 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. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Sustainable design requirements.
 - i. Review of mockups.
 - j. Possible conflicts.

- k. Compatibility requirements.
 - l. Time schedules.
 - m. Weather limitations.
 - n. Manufacturer's written instructions.
 - o. Warranty requirements.
 - p. Compatibility of materials.
 - q. Acceptability of substrates.
 - r. Temporary facilities and controls.
 - s. Space and access limitations.
 - t. Regulations of authorities having jurisdiction.
 - u. Testing and inspecting requirements.
 - v. Installation procedures.
 - w. Coordination with other work.
 - x. Required performance results.
 - y. Protection of adjacent work.
 - z. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 - 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.
- A. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Engineer, but no later than 90 days prior to the scheduled date of Substantial Completion.
- 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 - 2. Attendees: Authorized representatives of Owner, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.
 - e. Requirements for completing sustainable design documentation.
 - f. Requirements for preparing operations and maintenance data.
 - g. Requirements for delivery of material samples, attic stock, and spare parts.
 - h. Requirements for demonstration and training.
 - i. Preparation of Contractor's punch list.
 - j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.

- k. Submittal procedures.
- l. Owner's partial occupancy requirements.
- m. Installation of Owner's furniture, fixtures, and equipment.
- n. Responsibility for removing temporary facilities and controls.

B. Progress Meetings: **Conduct** progress meetings at biweekly intervals.

- 1. Coordinate dates of meetings with preparation of payment requests.
- 2. Attendees: In addition to representatives of Owner and Engineer, 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.
- 3. 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) Status of sustainable design documentation.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site use.
 - 9) Temporary facilities and controls.
 - 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of correction of deficient items.
 - 13) Field observations.
 - 14) Status of RFIs.
 - 15) Status of Bid Requests.
 - 16) Pending changes.
 - 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - 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.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 31 00

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SECTION 01 32 00 - 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 01 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. Startup Construction Schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Field condition reports.
 - 7. Unusual event reports.
 - 8. Construction photographs.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
 - 2. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
 - 3. Division 01 Section "Quality Control" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical activities are activities on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor activity is an activity that precedes another activity in the network.
 - 3. Successor activity is an activity that follows another activity in the network.

- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Engineer.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Fagnets: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- H. Major Area: A story of construction, a separate building, or a similar significant construction element.
- I. Milestone: A key or critical point in time for reference or measurement.
- J. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file, where indicated.
 - 2. PDF file.
 - 3. Two paper copies of sufficient size to display entire period or schedule, as required.
- B. Startup Construction Schedule.
 - 1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule of size required to display entire schedule for entire construction period.
 - 1. Submit a working digital copy of schedule, using software indicated and labeled to comply with requirements for submittals. Include type of schedule, Initial or Updated and date. Initial schedule must be submitted within 10 days of date of agreement.
 - 2. After review of initial schedule, submit updated schedule after 10 days.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 - 3. Total Float Report: List of all activities sorted in ascending order of total float.
 - 4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.
- F. Construction Schedule Updating Reports: Submit with Application for Payment
- G. Daily Construction Reports: Submit at biweekly intervals.
- H. Material Location Reports: Submit at weekly intervals.
- I. Site Condition Reports: Submit at time of discovery of differing conditions.
- J. Unusual Event Reports: Submit at time of unusual event.
- K. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Engineer's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 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 submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 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.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. 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.
- B. 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 Engineer.
 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 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 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 5. Commissioning Time: Include no fewer than 15 days for commissioning.
 6. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Engineer's administrative procedures necessary for certification of Substantial Completion.
 7. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. 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. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 6. 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.
 7. 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. Building flush-out.
 - m. Startup and placement into final use and operation.
 - n. Commissioning.
8. Construction Areas: 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. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
- 1. Refer to Division 01 Section "Payment Procedures" for cost reporting and payment procedures.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
- 1. Unresolved issues.
 - 2. Unanswered Requests for Information.
 - 3. Rejected or unreturned submittals.
 - 4. Notations on returned submittals.
 - 5. Pending modifications affecting the Work and Contract Time.
- G. 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 final completion percentage for each activity.

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

1.8 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.
 - 2. List of separate contractors at Project site.
 - 3. Approximate count of personnel at Project site.
 - 4. Equipment at Project site.
 - 5. Material deliveries.
 - 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 - 7. Testing and inspection.
 - 8. Accidents.
 - 9. Meetings and significant decisions.
 - 10. Unusual events.
 - 11. Stoppages, delays, shortages, and losses.
 - 12. Meter readings and similar recordings.
 - 13. Emergency procedures.
 - 14. Orders and requests of authorities having jurisdiction.
 - 15. Change Orders received and implemented.
 - 16. Work Change Directives received and implemented.
 - 17. Services connected and disconnected.
 - 18. Equipment or system tests and startups.
 - 19. Partial completions and occupancies.
 - 20. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals, prepare a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
 2. Material stored prior to previous report and since removed from storage and installed.
 3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D. Unusual Event Reports: 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, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points.
1. Take 20 photographs to show existing conditions before starting the Work.
- C. Periodic Construction Photographs: Take 20 photographs weekly coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- D. Final Completion Construction Photographs: Take 50 photographs after date of Substantial Completion for submission as Project Record Documents.

END OF SECTION 01 32 00

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SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Division 01 Section "Payment Procedures" For submitting Applications for Payment and the schedule of values.
 - 2. Division 01 Section "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
 - 3. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 4. Division 01 Section "Quality Requirements" for submitting test and inspection reports and schedule of tests and inspections.
 - 5. Division 01 Section "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Engineer's approval. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals 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.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Engineer's final release or approval.

1.5 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
1. Project name.
 2. Date.
 3. Name of Engineer.
 4. Name of Contractor.
 5. Name of firm or entity that prepared submittal.
 6. Names of subcontractor, manufacturer, and supplier.
 7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier, and alphanumeric suffix for resubmittals.
 8. Category and type of submittal.
 9. Submittal purpose and description.
 10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
 11. Drawing number and detail references, as appropriate.
 12. Indication of full or partial submittal.
 13. Location(s) where product is to be installed, as appropriate.

14. Other necessary identification.
 15. Remarks.
 16. Signature of transmitter.
- B. Options: Identify options requiring selection by Engineer.
- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Engineer on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
- D. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.
- E. Submittals for Web-Based Project Software: Prepare submittals as PDF files, or other format indicated by Project software website.

1.6 SUBMITTAL PROCEDURES

- A. Engineer's Digital Data Files: Electronic digital data files of the Contract Drawings will not be provided by Engineer for Contractor's use in preparing submittals.
- B. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Email: Prepare submittals as PDF package and transmit to Engineer by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Engineer.
 - a. Engineer will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections 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.

- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 calendar 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 15 calendar days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Engineer's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Engineer and to Engineer's consultants, allow **15 calendar** days for review of each submittal. Submittal will be returned to **Engineer** before being returned to Contractor.
- E. Resubmittals: Engineer will review each of Contractor's submittals the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse the cost of Engineer's services made necessary to review such additional resubmittals.
1. Make resubmittals in same form and number of copies as initial submittal.
 - a. Note date and content of previous submittal.
 - b. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - c. Resubmit submittals until they are marked with approval notation from Engineer's action stamp.
- F. 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.
- G. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Engineer's action stamp.

1.7 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are unsuitable 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 catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
 - a. Two opaque (bond) copies of each submittal. Engineer will return one copy.
 - b. Three opaque copies of each submittal. Engineer will retain two copies; remainder will be returned.

3. BIM Incorporation: Develop and incorporate Shop Drawing files into BIM established for Project.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit **one** full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.
 6. 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 specified material or product, 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.

- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.

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

- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

- G. Certificates:
 1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
 2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
 4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
 5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

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

H. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit 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:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

1.8 DELEGATED-DESIGN SERVICES

- 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 insufficient to perform services or certification required, submit a written request for additional information to Engineer.

- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file of certificate, 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.
- C. BIM Incorporation: Incorporate delegated-design drawing and data files into BIM established for Project.
 - 1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as original Drawings.

1.9 REQUESTS FOR INFORMATION

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

1.10 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.
- B. Project Closeout and Maintenance Material Submittals: See Requirements in Division 01 Section "Closeout Procedures."
- C. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include 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.
 - 1. Engineer will not review submittals received from Contractor that do not have Contractor's review and approval.

1.11 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 or its subconsultant will review each submittal, make marks to indicate corrections or revisions required, and return it.
 - 1. PDF Submittals: Engineer will indicate, via markup on each submittal, the appropriate action.
 - a. See Division 00, Section "Supplementary Conditions" for description of terminology on Engineer's Stamp applied via markup to each submittal.
- C. Informational Submittals: Engineer will review each submittal and will not return it or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Engineer.
- E. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- F. Engineer will return without review submittals received from sources other than Contractor.
- G. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 33 00

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SECTION 01 40 00 - QUALITY CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for quality control services.
- B. Testing and inspection 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 quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.
- C. Related Requirements:
 - 1. Division 01 Section "Cutting and Patching" specifies requirements for repair and restoration of construction disturbed by inspection and testing activities.
 - 2. Division 01 Section "Submittal Procedures" specifies requirements for development of a schedule of required tests and inspections.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

- C. 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, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
 - 1. Laboratory Mockups: Full-size physical assemblies constructed and tested at testing facility to verify performance characteristics.
 - 2. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as part of permanent construction, consisting of multiple products, assemblies, and subassemblies.
 - 3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes; doors; windows; millwork; casework; specialties; furnishings and equipment; and lighting.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that construction will comply with requirements.
- J. 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. Contractor's quality-

control services do not include contract administration activities performed by Engineer.

1.4 DELEGATED-DESIGN SERVICES

- 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.

1.5 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Engineer for direction 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.

1.6 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups.
 - 1. Include plans, sections, and elevations, indicating materials and size of mockup construction.
 - 2. Indicate manufacturer and model number of individual components.
 - 3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.
- B. Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit 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, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.7 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- D. Testing Agency Qualifications: 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.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
- F. Reports: Prepare and submit certified written reports and documents as specified.
- G. Permits, Licenses, and Certificates: For Owner's record, 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.

1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award, and not less than five days prior to preconstruction conference. Submit in format acceptable to Engineer. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's Construction Schedule.

- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections including Subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
 - 3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Engineer has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.9 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, telephone number, and email address 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 inspection.

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 reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of technical 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.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.

1.10 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. 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. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. 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.

- D. **Installer Qualifications:** A firm or individual experienced in installing, erecting, applying, 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.
- E. **Professional Engineer Qualifications:** A professional engineer who is legally qualified to practice in jurisdiction where Project is located 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 product that are similar in material, design, and extent to those indicated for this Project.
- F. **Specialists:** Certain Specification Sections 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. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. **Testing Agency Qualifications:** An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. **Manufacturer's Technical Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. **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.
- J. **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 specified 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 and test assemblies, 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.
- K. 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 of size indicated.
 2. Build mockups in location indicated or, if not indicated, as directed by Engineer.
 3. Notify Engineer seven days in advance of dates and times when mockups will be constructed.
 4. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed to perform same tasks during the construction at Project.
 5. Demonstrate the range of aesthetic effects and workmanship.
 6. Obtain Engineer's approval of mockups before starting corresponding work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 8. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph.
- M. Room Mockups: Construct room mockups according to approved Shop Drawings incorporating required materials and assemblies, finished according to requirements. Provide required lighting and additional lighting where required to enable Engineer to evaluate quality of the Work. Comply with requirements in "Mockups" Paragraph.

1.11 RESPONSIBILITIES

- 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 inspection they are engaged to perform.
 2. Payment for these services will be made from testing and inspection 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. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
1. 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.
 2. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. 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.
- D. 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 locations 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 duties of Contractor.

- E. **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 01 Section "Submittal Procedures."
- F. **Manufacturer's Technical Services:** Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. **Associated Contractor Services:** Cooperate with agencies and representatives 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 inspection. 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 for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspection equipment at Project site.
- H. **Coordination:** Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. **Schedule of Tests and Inspections:** Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses.
 - 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.

1.12 SPECIAL TESTS AND INSPECTIONS

- A. **Special Tests and Inspections:** 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.
- B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, 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. Test and Inspection Log: 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 revisions as they occur. Provide access to test and inspection log for Engineer's reference during normal working hours.
 - 1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, 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 or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- 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 01 40 00

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SECTION 01 50 00 - 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 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Division 01, Section "Summary of "Work" for work restrictions and limitations on utility interruptions.
 - 2. Division 01, Section "Temporary Facilities and Controls" for responsibilities for temporary facilities and controls for projects utilizing multiple contracts.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Owner will pay sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Owner will pay water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations.
- E. Water and Sewer Service from Existing System: 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.
- F. Electric Power Service from Existing System: 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.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.
- F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the intended dust- and HVAC-control measures, their locations, and time frame for their operation. Include the following:
 - 1. Locations of dust-control partitions at each phase of work.
 - 2. HVAC system isolation schematic drawing.
 - 3. Location of air-filtration system discharge.
 - 4. Waste-handling procedures.
 - 5. Other dust-control measures.

1.5 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.
- C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to 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. Portable 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 and bottom rails. Provide galvanized-steel bases for supporting posts.
- B. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.2 EQUIPMENT

- A. General: Provide new equipment; if acceptable to Engineer/Architect, undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
- B. Water Hoses: Provide 0.75 in. heavy-duty, abrasion-resistant, flexible rubber hoses 100 ft. long, with pressure rating greater than maximum pressure of water distribution system; provide adjustable shut-off nozzles at hose discharge.
- C. Electrical power cords: provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.
- D. Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material. Locations of units shall be pre-approved by Village.
- E. First Aid Supplies: Comply with governing regulations.
- F. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide

hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.
- G. Temporary Fuel Tanks: Comply with all applicable safety and environmental regulations for temporary surface fuel tanks. Location and installation shall be subject to review and approval of Engineer/Architect and Fire Marshall.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 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.
1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."
- 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.

3.3 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 or private system as directed by authorities having jurisdiction.

- C. **Water Service:** Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. **Sanitary Facilities:** Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. **Temporary 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.
 - 1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- F. **Isolation of Work Areas in Occupied Facilities:** Prevent dust, fumes, and odors from entering occupied areas.
 - 1. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 - 2. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- G. **Electric Power Service:** Connect to Owner's existing electric power service. Maintain equipment 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.

3.4 SUPPORT FACILITIES INSTALLATION

- A. **General:** Comply with the following:
 - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 - 2. Maintain support facilities until Architect schedules Substantial Completion inspection. 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 or endanger permanent Work or temporary facilities.
- E. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 3. Maintain and touch up 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. Comply with progress cleaning requirements in Division 01 Section "Execution."
- G. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided 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.
- H. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided 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 stairs become damaged, restore damaged areas so no evidence remains of correction work.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to 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 01 Section "Summary of Work."
 2. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
 3. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 4. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 5. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. 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.
- E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- F. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- H. 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; manage fire-prevention program.
1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 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.

3.6 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 3. Indicate methods to be used to avoid trapping water in finished work.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
1. Protect porous materials from water damage.
 2. Protect stored and installed material from flowing or standing water.
 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 4. Remove standing water from decks.
 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard and replace stored or installed material that begins to grow mold.
 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for **48** hours are considered defective and require replacing.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for **48** hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within **48** hours.

3.7 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. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. 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 roads and paved areas not intended for or acceptable for integration into permanent construction. 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, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section "Closeout Procedures."

END OF SECTION 01 50 00

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SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements governing Contractor's selection of products for use in Project.
- B. Related Requirements:
 - 1. Division 01 Section "Submittal Procedures" specifies requirements for submittal of the Contractor's Construction Schedule and the Submittal Schedule.

1.3 DEFINITIONS

- A. Products: Items obtained 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.
- B. Definitions used in this Article are not intended to change meaning of other terms used in Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms such are self-explanatory and have well recognized meanings in construction industry.
 - a. 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.
 - b. 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.
 - c. Comparable Product: Product that is demonstrated and approved by Engineer through submittal process 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.
 - d. "Foreign Products," as distinguished from "domestic products," are items substantially manufactured (50% or more of value) outside of United States and its possessions; or produced or supplied by entities substantially

owned (more than 50%) by persons who are not citizens of nor living within United States and its possessions.

2. "Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form part of Work.
 3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.
- C. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.
- D. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications. Submit a comparable product request, if applicable.

1.4 ACTION SUBMITTALS

- A. Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify basis-of-design product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 2. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within seven days of receipt of a comparable product request. Engineer will notify Contractor approval or rejection of the comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Engineer's Approval of Submittal: As specified in Division 01, Section "Submittal Procedures."
 - b. Use product specified if Engineer does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01, 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, select product compatible with products previously selected, even if previously selected products were also options.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
 - 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.
 - 3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional identification requirements.
- C. Foreign Product Limitations: Except under 1 or more of following conditions, provide domestic products, not foreign products, for inclusion in the Work:
 - 1. No available domestic product complies with Contract Documents.
 - 2. Domestic products that comply with Contract Document are only available at prices or terms that are substantially higher than foreign products that also comply with Contract Documents.

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 and vandalism. 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 determine compliance with the Contract Documents and to determine 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. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. 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:** Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. **Special Warranty:** Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. **Special Warranties:** Prepare a written document that contains appropriate terms and identification, ready for 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 indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. **Submittal Time:** Comply with requirements in Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, 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 meeting requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Engineer will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
 - a. Submit additional documentation required by Engineer in order to establish equivalency of suggested products. Evaluation of "or equal" product status is by the Engineer, whose determination is final.
- B. Product Selection Procedures:
1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
 4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, which complies with requirements.
 5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that

complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.

6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, which complies with requirements.
 7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated 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 requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
 - a. For approval of products by unnamed manufacturers, comply with requirements in Section "Substitution Procedures" for substitutions for convenience.
- C. Visual Matching Specification: Where Specifications require "match Engineer's sample," provide a product that complies with requirements and matches Engineer's sample. Engineer's decision will be final on whether a suggested product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section "Substitution Procedures" for bid of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Engineer from manufacturer's full range" or similar phrase, select a product that complies with requirements. Engineer will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Engineer will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Engineer may return requests without action, except to record noncompliance with these requirements:
1. Evidence that requested product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of requested product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
 2. Evidence that requested product provides specified warranty.

3. List of similar installations for completed projects with project names and addresses and names and addresses of Engineers and owners, if requested.
 4. Samples, if requested.
- B. Submittal Requirements: Approval by the Engineer of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS:

- A. Comply with manufacturer's instructions and recommendations for installation of products in applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01 60 00

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SECTION 01 73 00 – EXECUTION, CUTTING AND PATCHING, WARRANTIES

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. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
- B. Related Requirements:
 - 1. Division 01 "Summary of Work" for limits on use of Project site.
 - 2. Division 01 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 3. Division 01 Section "Submittal Procedures" for submitting surveys.
 - 4. Division 01 Section "Execution" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
 - 5. Division 01 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.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 PREINSTALLATION MEETINGS

- A. Cutting and Patching Conference: Conduct conference at Project site.
1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
 - a. Contractor's superintendent.
 - b. Trade supervisor responsible for cutting operations.
 - c. Trade supervisor(s) responsible for patching of each type of substrate.
 - d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affecting by cutting and patching operations.
 2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Engineers and owners, and other information specified.
- B. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 4. Dates: Indicate when cutting and patching will be performed.
 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

- E. Certified Surveys: Submit two copies signed by professional engineer.
- F. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.6 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Engineer of locations and details of cutting and await directions from Engineer before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 - 2. 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. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Plumbing piping systems.
 - f. Mechanical systems piping and ducts.
 - g. Control systems.
 - h. Communication systems.
 - i. Fire-detection and -alarm systems.
 - j. Conveying systems.
 - k. Electrical wiring systems.
 - l. Operating systems of special construction.
 - 3. Other Construction Elements: Do not cut and patch other construction elements or 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. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.

- g. Noise- and vibration-control elements and systems.
- 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
 - 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.
- B. In-Place Materials: Use materials for patching 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 provide a match acceptable to Engineer for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, 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; underground electrical services; and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, 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. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
1. Description of the Work.
 2. List of detrimental conditions, including substrates.
 3. List of unacceptable installation tolerances.
 4. Recommended corrections.
- D. 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 caused by differing field conditions outside the control of Contractor, submit a request for information to Engineer according to requirements in Division 01, Section "Project Management and Coordination."

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 Engineer promptly.

- B. General: Engage a professional engineer 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 limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Engineer when deviations from required lines and levels exceed allowable tolerances.
 - 7. 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 rim 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 Engineer. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Engineer 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.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by professional engineer, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

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.
 4. Maintain minimum headroom clearance of 8 feet in occupied and unoccupied spaces.
- 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: Where possible, select tools or equipment that minimize production of excessive noise levels

- F. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Engineer.
 - 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.
- G. 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.
- H. Repair or remove and replace damaged, defective, or nonconforming Work.
 - 1. Comply with Section "Closeout Procedures" for repairing or removing and replacing defective Work.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, 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. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. 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.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Division 01, Section "Summary of Work."
- F. 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 minimize interruption to occupied areas.

- G. 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 planned 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 neatly to minimum 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 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.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical 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 minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features 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, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends 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 condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction forces.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.

2. Preinstallation Conferences: Include Owner's construction forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

3.8 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 (27 deg C).

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: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
 - 1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.
- H. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01, Section "Temporary Facilities and Controls."
- I. 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.
- J. 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.
- K. 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.

3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Section "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Control."

3.10 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. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 73 00

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SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Closeout requirements for specific construction activities are included in appropriate Sections in Divisions 02 through 14, 21-27, and 31-33.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at final completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Engineer. Label with manufacturer's name and model number.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Engineer's signature for receipt of submittals.
 5. Submit testing, adjusting, and balancing records.
 6. Submit sustainable design submittals not previously submitted.
 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Division 01 Section "Demonstration and Training."
 6. Advise Owner of changeover in utility services.

7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements.
 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer 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 Engineer, that must be completed or corrected before certificate will be issued.
1. 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.

1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Division 01, Section "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
 5. Submit final completion photographic documentation.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer 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. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - a. Engineer will provide one repeat inspection under its contract with Owner. Subsequent inspections shall be at Contractor's expense.

- b. Upon completion of reinspection, Engineer 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.
- c. If necessary, reinspection will be repeated.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization 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.
 1. Organize list of spaces in sequential order 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 Engineer.
 - d. Name of Contractor.
 - e. Page number.
 4. Submit list of incomplete items in the following format:
 - a. PDF electronic file. Engineer will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Engineer for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- 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 Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
 1. Submit by email to Engineer.

PART 2 - PRODUCTS (NOT APPLICABLE).

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.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform 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 designated 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 not planted, mulched, or 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; clean according to manufacturer's recommendations 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. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - 1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.
 - p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - q. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Division 01 Section "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
- 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.

- a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 77 00

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SECTION 017839 - 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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. 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 Requirements:
 - 1. Section "Closeout Procedures" for general closeout procedures.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints and one file prints.
 - 2) Engineer will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints and three sets of prints.
 - 2) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.
- E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.4 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 1. Preparation: Mark record prints to show the actual installation and unit quantity where installation varies from that shown originally. Required individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding 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 acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding photographic documentation.
 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. Actual equipment locations.
 - d. Changes made by Change Order or Construction Change Directive.
 - e. Changes made following Engineer's written orders.
 - f. Details not on the original Contract Drawings.
 - g. Field records for variable and concealed conditions.
 - h. Record information on the Work that is shown only schematically.
 - i. Actual location and quantity of unit price items of the Work.
 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.

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 Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Engineer. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Annotated PDF electronic file with comment function enabled.
 2. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.
 3. Refer instances of uncertainty to Engineer for resolution.
 4. Engineer will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
 - a. See Section 013100 "Project Management and Coordination" for requirements related to use of Engineer's digital data files.
 5. Engineer will provide data file layer information. Record markups in separate layers.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Engineer.
 - e. Name of Contractor.

1.5 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 Drawings, and record Product Data and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file.

1.6 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. 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, and Product Data where applicable.

C. Format: Submit record Product Data as annotated PDF electronic file.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.7 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.

B. Format: Submit miscellaneous record submittals as PDF electronic file.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 017839

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SECTION 02 51 30 - GENERAL CONCRETE SURFACE PREPARATION

PART 1 - GENERAL

1.1 DEFINITIONS

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

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 02 51 30

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SECTION 02 51 40 - SURFACE PREPARATION FOR PATCHING AND OVERLAY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 REFERENCES

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

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 INSPECTION

- A. Floor Slabs:
 - 1. Floor slab delaminations: locate by sounding surface with hammer, rod, or chain drag.
 - 2. When delaminated area is struck, distinct hollow sound is heard.
 - 3. Contractor: sound all designated floors for delaminations.

4. Certain structural systems that contain thin slab thicknesses with Welded Wire Reinforcement or other small diameter reinforcing, such as waffle slab or precast tees, may have significant deterioration without evidence of delaminations. These structural systems require qualified personnel to provide additional inspections, primarily visual in nature, to define the extent of deterioration.
 5. Contractor: Visually inspect thin slab thicknesses with small diameter reinforcing for deterioration.
- B. Vertical and Overhead Surfaces:
1. Vertical and overhead surface delaminations: locate by sounding appropriate member with hammer or rod.
 2. Cracks, usually horizontal in orientation along beam faces, and vertical in orientation near column corners are indicators of delaminated concrete.
 3. Contractor: sound only vertical and overhead surfaces that show evidence of cracking and/or salt and water staining.
- C. Delaminated areas, once located by Contractor, shall be further sounded to define limits. Mark limits with chalk or paint.
- D. Contractor: locate spalls by visual inspection and mark boundaries with chalk or paint after sounding surface.
- E. Engineer/Architect will define and mark additional unsound concrete areas for removal, if required.
- F. Areas to be removed shall be as straight and rectangular as practical to encompass repair and provide neat patch.
- G. Contractor: Locate and determine depth of all embedded REINFORCEMENT, POST-TENSIONING TENDONS, and ELECTRICAL CONDUIT in repair area and mark these locations for reference during concrete removal. Do **NOT** nick or cut any embeds unless approved by Engineer/Architect.
- H. For overlay installation, boundaries of overlay areas will be as defined in project drawings and verified by Engineer/Architect.

3.2 PREPARATION

- A. Temporary shoring may be required at concrete floor repair areas exceeding 5 sq ft and at any beam, joist, or column repair. Contractor: Review all marked removal and preparation areas and request clarification by Engineer/Architect of shoring requirements in questionable areas. Shores shall be in place prior to concrete removal and cavity preparation in any area requiring shores.
- B. Delaminated, spalled and unsound concrete floor areas: mark boundaries. All concrete shall be removed from within marked boundary to minimum depth of 0.75 in. using 15 to 30 lb chipping hammers equipped with chisel point bits. When directed by Engineer/Architect, chipping hammers less than 15 lb shall be used to minimize

damage to sound concrete. Near vertical chipped edge shall be provided along perimeter of repair area where shown on drawings. Areas to be removed shall encompass repair and provide uniform cavity surface. If delaminations exist beyond minimum removal depth, chipping shall continue until all unsound and delaminated concrete has been removed from cavity.

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

3.3 INSPECTION OF REPAIR PREPARATION

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

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

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

3.4 REINFORCEMENT AND EMBEDDED MATERIALS IN REPAIR AREAS

- A. All embedded reinforcement exposed during surface preparation that has lost more than 50% (25% if 2 or more consecutive parallel bars and/or tendons are affected) of original cross-section due to corrosion shall be considered DEFECTIVE. All non-defective exposed reinforcement that has lost section to extent specified above as direct result of Contractor's removal operations shall be considered DAMAGED.
- B. Embedded materials including, but not limited to, electrical conduit, corrosion protection systems and snow/ice melting equipment shall be protected by Contractor during removal operations. Damage due to removal operations shall be repaired by Contractor in accordance with national code requirements at no cost to Owner. Embedded materials which are defective due to pre-existing conditions may be repaired or replaced by Contractor or abandoned at Owner's option and cost.
- C. Supplement defective or damaged embedded reinforcement by addition of reinforcement of equal diameter with Class "B" minimum splice per ACI 318 beyond damaged portion of reinforcement. Secure new reinforcement to existing reinforcement with wire ties and/or approved anchors. Supplemental reinforcement shall be ASTM A615 Grade 60 steel installed in accordance with Division 03 specification Sections. Tendon supplement or repair materials, when applicable, shall be as required by Section "Work Items."
- D. Loose and supplemental reinforcement exposed during surface preparation shall be securely anchored prior to concrete placement. Loose reinforcement shall be adequately secured by wire ties to bonded reinforcement or shall have drilled-in anchors installed to original concrete substrate. Drilled-in anchors shall be Powers "Tie-Wire Lok-Bolt" anchors, ITW Ramset/Red Head "TW-1400" anchor, or approved equivalent. Supplemental reinforcing needed to be held off substrate shall be adequately secured by drilled-in anchors installed to original concrete substrate with Powers "Tie-Wire Spike", ITW Ramset/Red Head Redi-Drive "TD4-112" anchors, or approved equivalent. Engineer/Architect will determine adequacy of wire ties and approve other anchoring devices prior to their use. Securing loose and supplemental reinforcement is incidental to surface preparation and no extras will be allowed for this Work.
- E. Concrete shall be removed to provide minimum of 3/4 in. clearance on all sides of defective or damaged exposed embedded reinforcement that is left in place. Minimum of 1.5-in. concrete cover shall be provided over all new and existing reinforcement. Concrete cover over reinforcement may be reduced to 1 in. with Engineer/Architect's approval if coated with an approved epoxy resin.

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

3.5 CLEANING OF REINFORCEMENT WITH DELAMINATION AND SPALL CAVITIES

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

3.6 PREPARATION OF CAVITY FOR PATCH PLACEMENT

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

END OF SECTION 02 51 40

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SECTION 03 25 19 – EXTERNALLY BONDED FIBER REINFORCED POLYMER (FRP) REINFORCEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings apply to this Section.

1.2 SUMMARY

- A. This Section includes the minimum requirements and design of externally bonded Fiber Reinforced Polymer (FRP) reinforcement systems and provision of all labor, tools, materials, equipment, and supervision necessary to prepare the surface of structural concrete members and install FRP Reinforcement.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 02 Section "General Concrete Surface Preparation."
 - 2. Division 02 Section "Surface Preparation for Patching and Overlay."

1.3 DEFINITIONS

- A. Engineer – The Licensed Design Professional responsible for the overall design of the repair project and establishing requirements for the project.
- B. FRP Engineer – Licensed Design Professional responsible for designing and detailing the specifics of the FRP system to meet the requirements for the project.
- C. FRP System – The product comprising reinforcing fabrics and resin components installed to the surfaces of concrete members to be strengthened.
- D. Independent Testing Agency – A testing laboratory experienced in inspection of FRP in the field and testing FRP witness panels.
- E. Manufacturer – The supplier of the FRP system including its constituents and component materials.

1.4 QUALITY ASSURANCE

- A. Submit manufacturer specified QA/QC manual indicating product standards, physical and chemical characteristics, technical specifications, limitations, installation instructions, maintenance instructions and general recommendations regarding each individual material.

- B. Quality Control procedures performed by the Manufacturer shall include, but not be limited to the following:
1. The Manufacturer shall have a nationally recognized program of contractor training, certification, and technical support.
 2. The Manufacturer shall have a minimum of ten years of experience in FRP reinforcement confirmed by actual field tests of minimum **100** successful installations.
 3. The manufacturer shall supply all constituent materials of the FRP system excluding any top coating materials and verifies that the constituent materials (fiber sheets and resins) have been tested together as a system.
 4. The Manufacturer shall be able to supply testing data to demonstrate system properties and durability of the actual FRP Reinforcement to be used
 5. The manufacturer shall maintain a formal, hands-on training program to train Contractors to install their FRP system.
 6. The manufacturer shall employ a technical field representative knowledgeable of the design of their FRP systems, how they are installed and the guidelines presented in ACI 440.2R.
- C. Quality Control procedures performed by the Contractor shall include, but not be limited to the following:
1. The Contractor shall be trained and certified by the Manufacturer and shall have completed a program of instruction in the use of FRP Reinforcement.
 - a. The Contractor shall have a minimum of five years of experience in FRP Reinforcement confirmed by actual field tests of at least 25 successful installations.
 - b. The Contractor shall inspect all materials prior to application to assure that they meet specifications and have arrived at the job-site undamaged.
 - c. The FRP Reinforcement shall be completely inspected by the contractor during and immediately following application of the composite materials. Conformance with the design drawings, proper alignment of fibers and quality workmanship shall be assured. Entrapped air shall be released or rolled out before the epoxy sets. Defects shall be noted in the Daily Construction Log.
 - d. After FRP Reinforcement has cured, the contractor shall inspect all the work to check for voids and or debonding. Repairs shall be made as per Section "Repair of Defects" and noted in the Daily Construction Log.
 - e. The Contractor shall maintain a documented safety program.
 - f. Contractor shall arrange a pre-installation conference to be held at the Project with a representative of the Owner, Engineer, and Manufacturer's Field Representative. Items to be discussed at the conference includes, but are not limited to:
 - 1) Surface preparation
 - 2) Installation limitations, including surface moisture and temperature
 - 3) Installation details
 - 4) Field Quality Assurance program

- g. Note: The Engineer of Record may suspend the work if the Contractor substitutes an unapproved FRP system or unapproved personnel during construction.

- D. Any part of the Work that fails to comply with the requirements of the Contract Documents may be rejected by the Engineer. Repaired Work to be in full compliance with the Contract Documents in accordance with Part 3, Article 3.6. Repair of rejected Work will be at the Contractor's expense.

1.5 REFERENCES

- A. Comply with provisions of following codes, specifications and standards except where more stringent requirements are shown on Drawings or specified herein:

- B. ASTM Standards and Reports
 - 1. C581-15 (2015), Standard Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass-Fiber-Reinforced Structures Intended for Liquid Service.
 - 2. D1141-98 (2013), Standard Practice for the Preparation of Substitute Ocean Water.
 - 3. D2247-15 (2015), Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
 - 4. D3039/D3039M-08 (2008), Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials.
 - 5. D3045-92 (2003), Practice for Heat Aging of Plastics Without Load.
 - 6. D7522/D7522M-15 (2015), Standard Test Method for Pull-Off Strength for FRP Laminate Systems Bonded to Concrete Substrate.
 - 7. E84-16 (2016), Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 8. E104-02 (2012), Standard Practice for Maintaining Constant Relative Humidity by Means of Aqueous Solutions.
 - 9. E1640-13 (2013), Standard Test Method for Assignment of the Glass Transition Temperature by Dynamic Mechanical Analysis.
 - 10. G153-13 (2013), Standard Practice for Operation Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials.
 - 11. D7290-11 (2011), Standard Practice for Evaluating Material Property Characteristic Values for Polymeric Composites for Civil Engineering Structural Applications.

- C. ACI Standards and Reports
 - 1. ACI 440.2R-08 (2008), Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures,
 - 2. ACI 301 (2016), Specifications for structural Concrete, included in total as specification for this structure except as otherwise specified herein.
 - 3. ACI 318 (2014), Building Code Requirements for Structural Reinforced Concrete,
 - 4. ACI 440 R-07 (2007), Report on Fiber-Reinforced Polymer (FRP) Reinforcement for Concrete Structures.

5. ACI 440 R-96 (2002), State-of-the-Art Report on Fiber Reinforced Plastic (FRP) Reinforcement for Concrete Structures.

D. ICRI Standards and Reports

1. ICRI 310.2R (2013), Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays and Concrete Repair.
2. ICRI 330.1 (2006), Guide for the Selection of Strengthening Systems for Concrete Structures.
3. ICRI 330.3 (2016), Guide Specifications for Externally Bonded FRP Fabric for Strengthening Concrete Structures.
4. ICRI 210.3R (2013), Guide to Using In-Situ Tensile Pull-Off Tests to Evaluate Bond of Concrete Surface Materials.

1.6 SUBMITTALS

- A. Make submittals in accordance with requirements of specified in this Section.
- B. Product Data: Submit product data for all products and constituent materials as specified in this Section and related Contract Documents. Include product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, cleaning and safety information, and general recommendations regarding each material listed. Submit all product data prior to start of work. The Engineer may reject products that are not listed or do not meet the requirements of this specification.
- C. Contractor: Submit manufacturer's product data sheets, technical sheets, recommended application procedures, resin working times, and information on FRP system.
 1. Test data including:
 - a. Tensile properties of the FRP system including the method of reporting properties (net fiber or gross laminate), test methods used, and the statistical basis used for determining the properties.
 - b. Durability for the FRP system in the types of environment expected.
 - c. Structural test reports pertinent to the intended application.
 2. Shop drawings and design details shall show:
 - a. Location and installation limits of FRP Reinforcement.
 - b. All surface preparation.
 - c. Complete system details including, but not limited to, FRP Reinforcement type, primer, resin, filler, number of layers, orientation, and protection coating.
 - d. Special installation details including terminations.
- D. Installation Procedure: Submit installation procedure that addresses all known environmental and substrate conditions that affect the application and curing of the FRP system including a description of any remedial action to ensure the desired performance

of the system. Include a intended schedule for the installation of the FRP system that shows all critical milestones.

- E. Record of Obstructions: Submit a drawings or sketch showing the existing layout of obstructions including pipe, conduits, wiring, junction boxes, etc. That affect the installation of the FRP system.
- F. Material Safety Data Sheets (MSDS): Submit in accordance with the general conditions for all components of the FRP strengthening system including fiber sheets, resins, and protective top-coating materials.
- G. Test Reports:
 - 1. Submit test reports or data from the manufacturer confirming the material properties meet the specified requirements.
 - 2. Submit test reports validation of the effectiveness of the FRP anchor system.
- H. Quality Control Plan: Submit prior to starting construction, a quality control (QC) plan for approval by the Engineer addressing all activities and processes required to control the quality of the materials and installation. Include in the QC plan:
 - 1. Procedures for tracking and verifying the quality of all FRP constituent material.
 - 2. Procedures for inspection of all prepared surfaces prior to installation of the FRP.
 - 3. Procedures for inspection of installation of FRP system and completed work.
 - 4. Number of quality control test samples, and
 - 5. Procedures for repair of defective work.
- I. Qualifications of FRP system manufacturer: Submit the qualifications of FRP system manufacturer prior to ordering materials for the project that include the following information:
 - 1. Documentation demonstrating the manufacturer meets the requirements of Section 1.4A
- J. Qualifications of Installation Contractor: Submit with the bid the following information:
 - 1. Documentation demonstrating the Contractor meets the requirements of Section 1.4B.
 - 2. Certificate or letter from the manufacturer indicating the Contractor has been trained to install the FRP system.
- K. Qualification statement by the Contractor listing their completed FRP Reinforcement projects, including size, location, owner, and engineer/architect.
- L. Certification from the FRP manufacturer stating that the Contractor is an approved installer and has received all training required for the installation of the FRP system.
- M. Manufacturer's installation and maintenance instructions, and general recommendations regarding each material. Installation procedure should include but is not limited to surface preparation requirements, corner preparation methods, maximum

irregularity limitations, surface temperature and moisture limits, curing procedures, and application time limits between successive plies.

- N. Manufacturer's shipping, storage, handling, and shelf-life guidelines.
- O. Submit for record all on-site and laboratory testing results.
- P. As-Built Drawings: Submit as-built drawing(s) of the completed FRP installation including locations of any repairs to the FRP and deviations from the contract drawings.
- Q. Contractor Daily Reports: Submit Contractor's daily reports.
- R. Submit an approved ICC Evaluation Report in the name of the selected FRP system to be used on this project.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all materials to site in original, unopened containers, bearing following information:
 - 1. Name of product
 - 2. Name of manufacturer
 - 3. Date of preparation
 - 4. Lot or batch number
- B. Store materials under conditions as recommended by the Manufacturer in a cool dry place, off the ground, out of direct sunlight, flame, moisture, or other hazards. Protect from dust, direct sunlight, physical damage, rain, water, freezing and excessive heat, foreign matter or other detrimental conditions until ready for use. Replace packages or materials showing any signs of damage with new material at no additional cost to Owner.
- C. Products that have exceeded their shelf life shall not be used.
- D. Comply with manufacturer's written instruction for handling of all constituent materials comprising the FRP system, cleaning solvents, and any other materials required to complete the project.
 - 1. Handle fiber sheets with care. Avoid separating fibers, folding or wrinkling fiber sheets to prevent damage to the sheets and breakage of fibers.
 - 2. Stack cut fiber sheets flat or on a roll with a radius in compliance with the manufacturer's written recommendations. Do not fold sheets.
 - 3. Address safety hazards, including but not limited to skin irritation and sensitization, and breathing vapors and dust, when handling the materials.
 - 4. Monitor resins during and after mixing to avoid fuming, flammable vapors, fire or boiling.

- E. Contractor is required to confirm that all materials used in accordance with this Section conform to local, state, and federal environmental and worker's safety laws and regulations.
 - 1. Comply with local, state, federal regulations and as specified in the Contract Documents for maximum acceptable levels of volatile organic compounds (VOCs), hazardous air pollutants (HAPs) and toxicology of the FRP constituent materials.
 - 2. Make the MSDS for all constituent materials of the FRP system available and accessible to all personnel at the project site.
 - 3. Clean up the site of any hazardous materials used during the installation of the FRP system on a daily basis.
 - 4. Dispose of any component of the FRP system that has exceeded its shelf life or pot life, or has not been properly mixed or stored, and any unused or excess material that is deemed waste in compliance with applicable regulations.

- F. The Contractor shall properly dispose of empty containers in accordance with local regulations.

1.8 PROJECT CONDITIONS

- A. Do not apply FRP Reinforcement materials if raining, snowing, or dew condensation is expected or existing concrete surface is wet or if the ambient or surface temperature is below 40° F.

- B. The ambient temperature and temperature of the epoxy components shall be between 50° F and 80° F at the time of mixing. See Manufacturer's technical data sheets for more specific instructions.

- C. The ambient temperature and temperature of the components shall be between 50°F and 80°F, unless provisions have been made to ensure components' temperature is maintained within this range or the range specified by the manufacturer for a time period required for curing of the resin.

- D. Do not apply the FRP system or any of its constituent materials to frozen or wet surfaces. Do not apply FRP materials if rain, snow or dew point condensation is expected.

- E. FRP system should not be installed when the concrete substrate has compressive strength less than 2500 psi.

- F. Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified material.

- G. The Contractor is solely responsible for fume control during application of primer and resin, etc. Contractor personnel shall use protective equipment and area shall be well vented to the outside. As a minimum, Installer must take the following precautions:
 - 1. Contractor to locate and protect building air intake during application.
 - 2. Contractor to follow all state, federal, and local safety regulations.

3. Contractor to follow all Manufacturers' safety requirements.

1.9 WARRANTY

- A. System manufacturer and Contractor shall furnish Owner a written single source performance guarantee that the FRP system will remain installed in a sound condition for a period of five (5) years starting from the date of substantial completion of the project.

1.10 SAFETY

- A. Perform all Work in accordance with the applicable local, state and federal requirements for safety, and the recommendations of ICRI 120.1

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products from one of the following approved FRP system manufacturers:
 1. Sika Corporation (Sika), Lyndhurst, NJ.
 2. BASF Building Systems (BASF), Shakopee, MN
 3. Fyfe LLC, an Aegion company (Fyfe), San Diego, California
 4. Mapei Corporation (MAPEI), Deerfield Beach, FL
 5. Structural Technologies, Hanover, MD.
 6. Ruredil Technologies (Ruredil), San Donato Milanese, Italy.
 7. Vector Corrosion Technologies (Vector), Winnipeg, MB.
- B. Alternate FRP strengthening systems may be substituted provided they meet the requirements of this specification. Submit all substitutions to the Engineer for approval.

2.2 MATERIALS

- A. All constituent materials comprising the FRP system shall be supplied by a single manufacturer, tested together as a system, and cured in the same manner as the expected field conditions. The manufacturer's name shall appear on the labels of the constituent materials.
- B. Dry Fiber Reinforcement Sheets: Continuous E-glass/E-CR glass fibers woven or assembled into a dry fabric. Fiber reinforcement sheets may be unidirectional, bi-directional, or multi-directional and be capable of being fully wetted out by the saturation resin.

- C. FRP Reinforcement System: Manufacturer's system consisting of glass-fiber reinforcement in the form of tow sheet with field-applied saturant or pre-impregnated sheet, epoxy primers, fillers, adhesives, saturants, and topcoats, designed for use as externally bonded structural reinforcement for concrete. Some of the acceptable materials for this Work are as follows:

- D. FRP Pre-Cured Strips: Shall be high strength, high modulus, unidirectional carbon fiber reinforced polymer (CFRP) strips with a minimum tensile strength of 19,000 lbs/in-width/ply. Some of the approved products are:
 - 1. MasterBrace LAM 50/1.4 CFS or 100/1.4CFS, by BASF.
 - 2. Tyfo UC Laminate, by Fyfe.
 - 3. Sika Carbodur, by Sika.
 - 4. V-Wrap Carbon Fiber Plate, by Structural Technologies.

- E. Glass Transition Temperature: Average glass transition temperature (ASTM E1640) of the cured FRP system shall be based on a minimum of 5 or more tests. The reported glass transition temperature of the cured FRP strengthening system shall exceed 140°F (60°C) or the maximum expected service temperature the FRP system is expected to experience plus 27°F (15°C), whichever is greater.

- F. Smoke and Flame Spread Requirements: FRP system shall meet a Class A smoke and flame spread rating in accordance with ASTM E84

- G. Durability Requirements: FRP system shall meet or exceed the following durability requirements:
 - 1. Retained tensile strengths and elongations of the FRP system after exposure to the environments listed below shall be reported as a percentage of the room temperature, dry test values.
 - 2. The percentage of the tensile strength retained shall be calculated by dividing the average of 5 or more tests made at the applicable environmental exposure condition by the average of 5 or more tests made at room temperature. Dry conditions. All tests shall be performed on FRP made from the same lots of fiber reinforcing sheets and polymer.
 - 3. Exposure Environments:

Environment	Exposure Time	Applicable Test
Water	3000 hours	ASTM D2247 ASTM E104
Saltwater	3000 hours	ASTM D1141 ASTM C581
Alkali (pH 9.5)	3000 hours	ASTM C581
Dry Heat	3000 hours	ASTM D3045
Freeze-Thaw	20 cycles	Use ICC-ES Method
Cyclic Exterior Exposure	2000 hours	ASTM G153

- 4. E-glass FRP systems shall retain 50% (for aggressive exposure conditions) or 65% (for normal exterior exposure) of their strength.

- H. Epoxies and accessories shall be as specified by the manufacturer of the FRP system. Epoxies and accessories shall be compatible with the FRP system. The manufacturer shall clearly define the epoxy resin working time. Any batch that exceeds the batch life shall not be used.
- I. Saturating Resin: Compatible with the fiber reinforcement sheets and other constituent materials comprising the FRP strengthening system. The saturation resin shall have sufficiently low viscosity to ensure full impregnation of the fiber sheets prior to the resin curing.
- J. Primer, if required by the manufacturer: Compatible with the other constituent materials comprising the FRP strengthening system.
- K. Putty, if required by the manufacturer: An adhesive of paste consistency and compatible with the other constituent materials comprising the FRP strengthening system. The manufacturer of the FRP system shall supply the putty as part of their system or as a product guaranteed to be compatible with the FRP system.
- L. Anchors: FRP anchoring system, if required, will be approved by the Engineer based on test reports, and other information including detailing, limitations and design parameter of the FRP anchoring system.
- M. Protective Coating: Protective coating shall be acrylic based and shall be UV resistant. Protective coating shall be compatible with the FRP system. Match color of adjacent coating, if applicable. Some of the approved products are:
 - 1. MasterProtect HB400 by BASF.
 - 2. Other types may be used only with Engineer's approval in writing.

PART 3 - EXECUTION

3.1 GENERAL

- A. Inspect surfaces to receive the work and report immediately in writing to the Engineer deficiencies in the surface that render it unsuitable for proper execution of this work.
- B. Protect vehicles, concrete, and other items surrounding work area from dust or damage due to Work of this Section.

3.2 EXAMINATION

- A. Contractor to verify dimensions of concrete members to be strengthened with externally bonded FRP reinforcement.
- B. Contractor is to visually assess the member to be strengthened and all surfaces to receive the FRP system for conditions that may affect the installation. Report all areas

exhibiting evidence of deterioration or distress to the Engineer prior to the initiation of surface preparation or FRP installation.

- C. Contractor is to provide necessary pathways, scaffoldings and other means of access to the repair areas for personnel (including Owner and Engineer representatives), equipment and materials.
- D. Contractor is to make a record drawing, sketch or photo of all obstructions including pipes, conduits, wiring, junction boxes and other items that affect the installation of the FRP system to enable them to be removed, relocated and subsequently reinstalled. Engineer shall approve any removal or relocation of obstructions.
- E. Contractor is to remove, replace, and dispose of any obstructions that prevent access to the repair areas. Engineer shall approve replacement and disposal obstructions removed to gain access to the repair areas.
- F. Contractor is to provide all necessary equipment in clean and operating condition and in sufficient quantities to ensure continuous and uninterrupted FRP installation.

3.3 SUBSTRATE REPAIR

- A. Contractor is to make all substrate concrete repairs in accordance with applicable specifications prior to installation of the FRP system. Before application of FRP system, consult with Engineer and manufacturer to determine the appropriate degree of curing and drying of repairs to which the FRP system will be bonded.
- B. Do not apply FRP systems to concrete suspected of containing corroded reinforcement or reinforcement which is likely to corrode and concrete exhibiting alkali aggregate reaction (AAR) unless when the ongoing corrosion is arrested and the degradation to substrate concrete is repaired and approved by the Engineer.
- C. Inject all cracks in the surface of concrete or the substrate wider than 0.03 in. with epoxy resin under pressure in accordance with applicable specifications prior to installation of the FRP system. Narrower cracks shall be sealed with putty/resin.

3.4 SURFACE PREPARATION

- A. Make all necessary substrate and crack repairs and secure approval from the Engineer prior to initiating surface preparation.
- B. All concrete surfaces shall be dry and free of surface moisture and frost, and tested by the Contractor to evaluate moisture transmission in accordance with ASTM D4263 "Indicating Moisture in Concrete by the Plastic Sheet Method".
- C. Remove all dust, laitance, grease, paint, curing compounds, waxes, impregnations, foreign particles, and other bond inhibiting materials from the surface by blast cleaning or equivalent mechanical means to a minimum ICRI CSP-3 concrete surface profile.

- D. All concrete surfaces shall be air blasted and vacuumed clean to a dust free condition.
- E. Concrete surface irregularities less than one inch shall be ground and smoothed and/or filled with manufacturer's sand thickened epoxy. Surface irregularities shall be limited to less than 0.04 inches. Surface irregularities greater than one inch shall be repaired with an approved cementitious repair mortar.
- F. Surface Profile: Remove localized out-of-place variations like form lines that exceed 1/32 in. (0.8 mm) or to the tolerances recommended by the FRP System manufacturer. Prepare concrete surface to a surface profile not less than CSP 3, as defined by ICRI 310.2R, or to the tolerances recommended by the FRP system manufacturer.
- G. Bug holes and voids should be filled with resin-based putty.
- H. Rounding Corners: Round all outside corners and sharp edges to where the FRP is wrapped around the member to a minimum radius of 0.5 in. (13mm). Construct a circular fillet to a minimum radius of 0.5 in. (13 mm), or per the manufacturer, at all inside corners where the FRP is installed. Internal corners shall be smoothed by trowelling epoxy mortar into the corners.
- I. Perform pull-off adhesion testing in accordance with ACI 503R to evaluate the tensile strength of the concrete on the surface where the FRP system is to be installed. Minimum tensile stress shall be 200 psi with concrete substrate failure. Perform a minimum of one (1) test for each location where FRP is to be installed.
- J. Independent Testing Agency shall approve preparation of all surfaces to receive the FRP system prior to application of the FRP system.

3.5 FRP REINFORCEMENT APPLICATION

- A. Install all FRP System components in strict accordance with Manufacturer's recommendations.
- B. Ensure moisture levels on concrete substrate and moisture vapor transmission rates comply with manufacturer's written recommendations.
- C. Prepare surfaces as required, including corner preparation.
- D. Remove dust and debris with compressed air as per specification.
- E. Clean up and protect area adjacent to element where FRP composite is being applied.
- F. Mix components only in quantity which can be used within its pot life. Do not batch delivered units into smaller quantities. Mix only full units. Primers, resins and other system components shall not be diluted with any solvent.
- G. Mixing of Resin Constituent Materials: mix all resin constituent materials in accordance with manufacturer's instructions. Follow manufacturer's instructions regarding mix ratio, temperature range, paddle type, mix durations, etc. Do not dilute any resin constituent

materials with any organic solvents or thinners. Discard any mixed resin that exceeds its pot life or shows signs of increased viscosity.

- H. Application of Primer and Putty: If required by the FRP system manufacturer, coat the concrete surface to receive the FRP system with a primer resin using a medium nap paint roller or other tools recommended by the manufacturer. Apply primer at a coverage rate such that it penetrates the pores of the concrete substrate but does not drip or run. Fill any bug holes or small voids and level any uneven surfaces with the putty resin using a trowel or putty knife or other tools recommended by the manufacturer to apply the putty. Do not apply the putty until the primer is tack-free, unless approved by the manufacturer. Fillers or other thickening agents may be added to the putty in accordance with the manufacturer's instructions. Do not apply putty to a previously applied primer or putty coat if that coat has fully cured, unless first prepared per the manufacturer's instructions.
- I. Impregnating with Saturating Resin and Applying Fiber Sheet: Follow manufacturer's recommended procedures for impregnating fiber sheets with saturating resin. Apply saturating resin using a medium nap roller or mechanical saturator. Do not apply saturating resin or impregnated fiber sheet to a previously applied resin coat if that coat has fully cured, unless prepared per the manufacturer's instructions. Place fiber sheet onto the substrate. Roll fiber sheets in the direction of the fibers using a fin roller to remove any air entrapped between the fiber sheets and concrete surface and to fully impregnate the fiber sheets with saturating resin. Achieve full contact with the concrete substrate during rolling. Do not roll unidirectional fiber sheets in the direction transverse to the fibers to avoid damaging the fibers.
- J. Alignment of FRP Materials: Install FRP sheets with the fibers aligned in the direction indicated on the drawings or other contract documents. Report any deviation in the alignment of the fibers of more than 5° (approximately 1 in/ft [90mm/m]) to Engineer for acceptance/rejection.
- K. Multiple Fiber Sheet Plies: Follow the manufacturer's recommended procedures for installing multiple fiber sheet plies and the contract documents for the orientation of the fibers, ply stacking sequence and length. Limit the number of plies applied in a single day to that which can be supported by the previously applied system without sloughing or sliding. Consult with the Manufacturer to determine the maximum number of plies that can be applied in a single day considering temperature and other variables. Do not apply additional fiber sheet plies to previously cured plies unless first prepared per the manufacturer's instructions. Apply an additional coat of saturating resin, if required by the manufacturer.
- L. Follow manufacturer's recommendations pertaining to time between applications of FRP system components.
- M. Using a roller or trowel, apply one prime coat of epoxy resin to the substrate. Allow primer to become tacky to the touch.
- N. Fill minor depressions with a primer and/or epoxy leveling course per manufacturer's recommendations.

- O. Care shall be taken not to damage the fibers in handling and unpacking the FRP Laminate. Care must be taken not to fray or otherwise damage the fibers when field cutting. Follow Manufacturer's recommendations for field cutting of strips.
- P. Lap Splicing of Fiber Plies: Provide lap splices equal to or exceeding the length recommended by the manufacturer such that the full tensile strength of the fiber sheet is achieved. Stagger lap splices for multiple plies or side-by-side installations. Document the location of lap splices on an as-built drawing or sketch.
- Q. Penetrations of FRP Sheets: Secure approval from the Engineer for all penetrations through the FRP system.
 - 1. Method 1: Wet Lay-Up
 - a. Apply FRP Reinforcement in accordance with Manufacturer's recommendations.
 - b. When using saturator equipment, follow Manufacturer's procedures for proper machine set-up and calibration. Rollers shall be calibrated to saturate the fabric with the proper resin-to-fabric ratio. The roller gap shall be checked daily by a qualified technician for accuracy. The resin-to-fabric ratio shall also be verified by resin usage and documented on the daily project logs.
 - c. Once the fabric is saturated, it may then either be spooled for easy handling, or cut to specified lengths and booked for handling. Care must be taken not to damage the fibers.
 - d. Apply FRP to substrate surface by hand lay-up, using methods that produce a uniformly saturated fabric and ensure proper orientation of the fabric. Fabric kinks, folds, or other forms of severe waviness including misalignment by more than 5 degrees (approximately 1 in. /ft.) should be reported to the Engineer for evaluation and acceptance.
 - e. Work from one end to the other. Remove any air entrapped in the fabric with a ribbed roller or squeegee. Apply subsequent layers, continuously or spliced, until designed number of layers is achieved, per project Drawings. Subsequent layers should be placed before the complete cure of the previous layer of resin (surface should be tacky). If previous layers are cured, interlayer surface preparation, such as light sanding or solvent application as recommended by the system manufacturer shall be required.
 - f. Sheets shall be lapped in the longitudinal direction 6 inches minimum or as indicated on the Drawings. Note: no lapping is required of the sheets parallel to the direction of fiber orientation.
 - 2. Method 2: Dry Lay-Up
 - a. Apply FRP Reinforcement in accordance with Manufacturer's recommendations.
 - b. FRP Reinforcement sheets shall be cut beforehand into prescribed lengths. Sheets shall be lapped in the longitudinal direction 6 inches minimum or as indicated on the Drawings. Note: no lapping is required for the sheets parallel to the direction of fiber orientation.
 - c. Follow Manufacturer's recommendations regarding primer open times.

- d. Apply a primary saturant coat uniformly by roller brush.
- e. Apply FRP Reinforcement sheets fiber side down to the concrete over the fresh saturant using a ribbed roller to remove any air bubbles.
- f. FRP Reinforcement sheets shall be left alone for about 30 minutes allowing for the primary saturant to soak through the fabric. Correct any dislocation on lifting.
- g. Apply secondary saturant coat with roller over installed sheets in order to impregnate and replenish primary saturant.
- h. If succeeding FRP Reinforcement sheets are specified on the Drawings repeat application procedures.

3. Method 3: Precured Strip Application

- a. Apply FRP Precured Strip in accordance with Manufacturer's recommendations.
- b. Care shall be taken not to damage the fibers in handling and unpacking the Strips.
- c. Strips may be either delivered to project site in factory pre-cut lengths, or cut on site. Care must be taken not to fray or otherwise damage the fibers when field cutting. Follow Manufacturer's recommendations for field cutting of strips.
- d. Strips shall be cleaned with a fast flashing solvent to remove any bond-inhibiting materials. A clean white cotton rag shall be used for this purpose. Continue cleaning the Strip in this manner until no black residue shows on the rag. Cleaning shall be performed the same day the strips are to be used.
- e. Apply epoxy adhesive to prepared concrete surfaces per Manufacturer's recommended thickness.
- f. Apply epoxy adhesive to FRP per Manufacturer's recommended thickness.
- g. Apply adhesive-coated fiber sheet to adhesive-coated concrete and roll with a hard rubber roller until fiber sheet is fully embedded in adhesive, air pockets are removed, and adhesive is forced out from beneath fiber sheet at edges.
- h. Apply additional layers using same procedure.

3.6 DETAILING AND CURING

- A. Detail all fabric edges, including termination points and edges, with thickened epoxy.

- B. Finish: All edges and seams must be feathered. Use system as directed by the manufacturer. Finish as specified between 24 and 72 hours after final application of epoxy. If after 72 hours the adhesive is cured, the surface must be roughened by hand sanding or brush blasting, prior to finishing.
- C. Protect finished installation of FRP Reinforcement from rain, sand, dust, etc. using protective sheeting or other barriers. Do not allow protective sheeting to come in contact with finished application.
- D. The FRP Reinforcement shall be completely inspected by the contractor during and immediately following application of the composite materials. Conformance with the design drawings, proper alignment of fibers and quality workmanship shall be assured. Entrapped air shall be released or rolled out before the epoxy sets. Defects shall be noted in the Daily Construction Log.
- E. Curing of finished application shall be per manufacturer's recommendations or a minimum of 24 hours and in order to achieve full strength.

3.7 REPAIR OF DEFECTS

- A. Upon completion of the curing process, the installed system shall be checked for voids, bubbles and delaminations. Defects shall be reported immediately to the Engineer.
- B. Repair procedures shall be performed in accordance with Manufacturer's recommendations and specified by the engineer. All repairs shall be subject to the same application, curing and quality control specifications as the original work.
 - 1. Small delaminations and voids less than 2 in² each are permissible as long as the delaminated area is less than 5% of the total laminate area and there are no more than 10 such delaminations per 10 ft². Else, small voids and bubbles shall be injected or back filled with epoxy.
 - 2. Medium sized delaminations and voids greater than 2 in² but less than 25 in² may be repaired by epoxy resin injection or ply replacement, depending on the size and number of delaminations and their location. The repair procedure should be determined by the Engineer.
 - 3. Larger size delaminations and voids greater than 25 in² should be repaired by selectively cutting away the affected sheet and applying an overlapping sheet patch of equivalent plies. The overlap should extend a minimum of 6 in. in all directions.
 - 4. In the event that laboratory testing determines a "sample batch" to possess insufficient material properties, remedial measures shall be taken. Any structural member where the installed FRP composite system has material properties determined to be below the minimum specified values, additional layers shall be installed until the composite thickness is increased by the same percentage as the deficiency of the material's tensile modulus. Or any other remediation directed by the Engineer.

3.8 PROTECTIVE COATING

- A. Apply protective coating in accordance with Manufacturer's recommendations.
- B. Do not apply any solvents to FRP prior to coating application unless approved by the Manufacturer.

3.9 CLEANING

- A. Uncured saturant may be cleaned from tools with an approved solvent and properly disposed.
- B. Cured saturant shall be removed by mechanical means and properly disposed.

4.1 FIELD QUALITY ASSURANCE

- A. Inspections: Contractor shall obtain the services of a qualified independent inspector from the manufacturer or approved by the manufacturer. Daily inspection reports shall be maintained and submitted to the Engineer. Daily inspection reports shall include, but not limited to:
 - 1. Date and time of installation.
 - 2. Ambient temperature, relative humidity, and general weather observations.
 - 3. Surface temperature of the concrete.
 - 4. Surface dryness per ACI 503.4
 - 5. Surface preparation methods and resulting profile using the ICRI Surface Profile Reference Chips.
 - 6. Qualitative description of surface cleanliness
 - 7. Type of auxiliary heat source, if applicable;
 - 8. Widths of cracks not injected with epoxy;
 - 9. Fiber or laminate batch number(s) and location installed;
 - 10. Batch numbers, mixture ratios, mixing times, and qualitative description of the appearance of all mixed resins, including primers, putties, saturates, and adhesives;
 - 11. Location of found defects, how the defects were dealt with;
 - 12. Observations of conformance with installation procedures;
 - 13. General progress of work.
- B. Inspection of Materials: Inspect all manufacturer's certifications for the delivered and stored FRP constituent materials for conformity to the contract documents prior to starting the project.
- C. Inspect all rounded outside corners and all fillets of inside corners prior to application of FRP. Rework all corners not meeting the minimum requirements of this specification.
- D. FRP System Tensile Testing: Use witness panels, fabricated on site to verify the cured FRP system meets the strength requirements of the project. The following criteria apply to the fabrication and testing of witness panels.

1. Make witness panels from the same fiber, saturating resins, equipment, and methods used in the installation of the FRP system. Make panels with one or two plies and large enough to extract a minimum of 10 tensile test coupons.
 2. Store witness panels in a dry location on site and allow the panels to cure under the same environmental conditions as the installed FRP system.
 3. Send panels to a third-party laboratory experienced with the tensile testing of FRP materials and test 5 samples in accordance with ASTM D3039. Report the average tensile strength and elongation to failure and the number of plies of the cured samples. The FRP system shall be accepted if average tensile strength exceeds 3,450 pounds/inch/ply. Otherwise test the remaining 5 samples and combine the results with the original five samples. The FRP system shall be accepted if the average tensile strength of the combined tests exceeds 3,450 pounds/inch/ply. Otherwise it shall be rejected.
- E. Epoxy Samples: The contractor shall maintain samples of the epoxy resins used as follows:
1. A minimum of three samples per day of each epoxy formulation or use shall be retained and submitted to the Engineer.
 2. Samples shall be made by placing epoxy into 3/8 inch inside diameter test tubes. The height of the samples shall be approximately 1 inch so that after trimming, a cylinder 3/8 inch diameter and 3/4 inch length can be obtained.
 3. The Engineer will determine the need for additional epoxy samples and compression testing after the completion of the initial testing.
- F. Inspection for Fiber Orientation: Prior to top coating, visually inspect the installed FRP system for fiber kinks, waviness and fiber orientation. Report unusual waviness and all kinks to the Engineer for acceptance/rejection. Report any deviation in the alignment of the fibers of more than 5° (approximately 1 in/ft [90 mm/m]) to Engineer for acceptance/rejection. Remove and repair rejected areas.
- G. Inspection for Delaminations: After waiting a minimum of 24 hours for the FRP system to initially cure and before the application of any top coatings, visually inspect the installed FRP system for delamination defects including bubbles, air pockets, voids and other areas of debonding. Lightly tap the cured FRP system with a hammer or other object to verify the location and size of defects by noting a “dead” sound. Conduct acoustic tap testing at a frequency of one tap per 0.5 ft² (0.05 m²). Small delaminations less than 2 in² (1290 mm²) each are permissible as long as the delaminated area is less than 5% of the total laminate area and there are not more than 10 such delaminations per 10 ft² (1 m²). Note the size and location of all delamination defects and report to the Engineer for acceptance/rejection. Repair or remove and repair rejected areas in accordance with Article 3.6.
- H. Inspection for Relative Cure of Resin: Obtain resin-cup samples for each batch of mixed resin used. Cure resin-cup samples at the temperature as the installed FRP system. Verify the relative cure of the resins comprising the FRP system by regularly examining the resin-cup samples. For questionable samples, consult with the manufacturer for acceptance criteria. Remove and repair the FRP system in all areas where the resin is found to have not properly cured.

- I. Inspection for adhesion to substrate: Inspect the bond between the cured FRP system and the concrete substrate by conducting direct pull-off test (ASTM D7522) and/or Direct Tension Adhesion Tests (ASTM D4541):
 1. Direct tension adhesion testing of cored samples shall be conducted using the method described by ASTM D7522 and/or ASTM D4541. A minimum of three tests shall be performed. Pull-off tests shall be performed on the vertical faces of the stem being strengthened at midspan.
 2. The prepared surface of the bonded FRP system shall be allowed to cure for minimum of 72 hours before execution of the direct tension pull-off test. The locations of the pull-off tests shall be representative and on flat surfaces. If no adjacent areas exist, the tests shall be conducted on areas of the FRP system subjected to relatively low stress during service. The minimum acceptable value for any single tension test is 200 psi. Additional tests may be performed to qualify the work.
 3. Pull-off strength shall exceed 200 psi (1.4 MPa) and failure shall occur in the concrete substrate. Failures occurring between plies or between the concrete substrate and the FRP system, regardless of the strength, shall be reported to the Engineer for evaluation.
 4. If one or more of the pull-off tests is found unacceptable, perform two additional tests adjacent to the area where the unacceptable pull-off test results were located. If one of the additional pull-off tests is found unacceptable, the Work shall be rejected
 5. Test locations shall be filled with thickened adhesive after the values have been recorded and verified by the special instructor and the test dollies have been removed.

- J. Laboratory Testing
 1. Sampling
 - a. Record lot number of fabric and epoxy resin used, and location of installation. Measure square footage of fabric and volume of epoxy used each day. Label each sample from each day's production.
 - b. A "sample batch" shall consist of two 12" by 12" samples of cured composite. A minimum of two "sample batches" shall be made daily. The two "sample batches" will be taken at appropriate times during the day as to ensure the maximum material deviance in the components of the FRP composite.

 2. Preparation of Samples
 - a. Prepare sample on a smooth, flat, level surface covered with polyethylene sheeting, or 16 mil plastic film, prime with epoxy resin. Then place one layer of saturated fabric and apply additional topping of epoxy. Cover with plastic film and squeegee out all bubbles.
 - b. Samples shall be stored in a sample box and not moved for a minimum 48 hours after casting. The prepared, identified samples shall be given to a pre-approved and experienced testing laboratory. The laboratory shall then precondition samples for 48 hours at 140°F before testing.

3. ASTM D3039 – Material Tension Tests
 - a. Testing specimens shall be cut from samples and tested for ultimate tensile strength, tensile modulus and percentage elongation as per ASTM D3039 in the longitudinal fiber direction.
 - b. Test a minimum of 15% of all samples as per ICC AC178. If one coupon fails, specimens from the same 12" x 12" sample will be tested. If these specimens also fail, the other 12" x 12" sample from the same "sample batch" will be tested. In the extreme case that this sample also fails, the remaining "sample batch" for that day will be tested and appropriate remediation shall be taken to ensure integrity of the system at locations from the failed "sample batch". In addition, 25% of the remaining samples shall be tested by the same criteria as per ICC AC178.
 - c. Testing results shall be made available within 3 weeks of sample submission.

4. Acceptance Criteria
 - a. FRP design values must be lower than the calculated mean determined from the test results received from ASTM D3039 field test specimens. Acceptable minimum values for ultimate tensile strength, tensile modulus, and elongation shall not be below the submitted design values.
 - b. Any values below the submitted design values are considered a failure and require remediation.

4.2 REPAIR OF DEFECTIVE WORK AND QC TEST RESULTS

- A. Submit all planned repair procedures to the FRP system to the Engineer for approval prior to making the repairs.
- B. Repair locations in the FRP system where the bond tests were performed by lapping additional plies in accordance with the manufacturer's written recommendations.
- C. Repair all unacceptable defects found in the cured FRP system following the manufacturer's written recommendations for making repairs to the FRP system. All repairs shall be subject to the same application, curing and quality control specifications as the original Work.
- D. Repair large delaminations greater than 25 in² (16,130 mm²) by selectively cutting away the affected FRP sheet and applying an overlapping FRP sheet patch of equivalent plies.
- E. Repair delaminations less than 25 in² (16,130 mm²) by injecting with saturation resin or by selectively cutting away the affected FRP sheet and applying an overlapping FRP sheet patch of equivalent plies. Engineer, in consultation with the manufacturer, shall approve the injection repair procedure. If any delamination growth is suspected between the FRP plies due to injection, the procedure shall be halted and reported to the Engineer.

- F. Localized Replacement of FRP System: for larger defects or where deemed necessary by the Engineer, remove the entire thickness of the defect to a minimum of 1 in. (25 mm) past the damage limit on all sides. Prepare the substrate and apply the FRP system in accordance with the manufacturer's written recommendations. Extend the additional FRP layers a minimum of 6 inches (153 mm) on all sides of the defect repair or greater as recommended by the manufacturer or specified elsewhere in contract documents Do not apply additional fiber sheets plies to previously cured plies unless first prepared per the manufacturer's instructions.

4.3 CLEANING

- A. Remove excess epoxy resin prior to curing of the FRP strengthening.
- B. Do not use solvents to remove or clean already cured epoxy resin.

END OF SECTION 03 25 19

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SECTION 033021 - CAST-IN-PLACE CONCRETE RESTORATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in-place concrete, including reinforcement, concrete materials, mix design, placement procedures, and finishes.
- B. Work in other Sections related to Cast-in-Place Concrete:
 - 1. Division 1 Section "Project Management and Coordination."
 - 2. Division 1 Section "Quality Control."
 - 3. Division 7 Section "Concrete Joint Sealants."

1.3 SUBMITTALS

- A. General: In addition to the following, comply with submittal requirements in ACI 301.
- B. Product Data: For each type of manufactured material and product indicated.
- C. Design Mixes: For each concrete mix.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
- C. Source Limitations: Obtain each type of cement of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- D. Comply with ACI 301, "Specification for Structural Concrete," including the following, unless modified by the requirements of the Contract Documents.
 - 1. General requirements, including submittals, quality assurance, acceptance of structure, and protection of in-place concrete.

2. Formwork and form accessories.
3. Steel reinforcement and supports.
4. Concrete mixtures.
5. Handling, placing, and constructing concrete.

PART 2 - PRODUCTS

2.1 FORMWORK

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

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Epoxy-coated Reinforcing Bars: ASTM A775
- C. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets, mats only. Roll stock prohibited.
- D. Epoxy-Coated Welded Wire Fabric: ASTM A884, fabricated from as-drawn steel wire into flat sheets, mats only. Roll stock prohibited.
- E. Provide bar supports according to CRSI's "Manual of Standard Practice." Use all-plast bar supports when in contact with exposed concrete surface.

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Types I or II or Type I/II.
- B. Fly Ash: ASTM C618, Class C or Class F.
- C. Ground-Granulated Blast Furnace Slag: ASTM C989, Gr. 100 or higher.
- D. Silica Fume: ASTM C1240.
- E. Normal-Weight Aggregate: ASTM C 33, uniformly graded, not exceeding **1-inch in** nominal size.
 1. Combine Aggregate Gradation: Well graded from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve, except that less than 8 percent may be retained on coarsest sieve and on No. 50 sieve, and less than 8 percent may be retained on sieves finer than No. 50.
- F. Lightweight Aggregates: ASTM C 330.
- G. Water: Potable and complying with ASTM C 1602.

2.4 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain no more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures. Do not use admixtures containing calcium chloride.
- B. General: Admixtures certified by manufacturer that all admixtures used are mutually compatible.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing or high-range water reducing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use high-range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, fiber reinforced concrete, and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 - 4. Use non-corrosive accelerator for all concrete, less than 8 inches thick, placed at air temperatures below 50 degrees Fahrenheit.
 - 5. Use high range water reducing admixture and viscosity modifying admixture, where required, in Self-Consolidating Concrete (SCC).
 - 6. Use corrosion-inhibiting admixture in parking structure slabs and other areas so noted on the drawings. The dosage shall be 3 gallons per cubic yard.
 - 7. Use shrinkage reducing/shrinkage compensating admixture where indicated on drawings to keep shrinkage below <<insert number>>.
 - 8. Use alkali-silica reactivity inhibitor unless ready mix company confirms that the aggregates to be used on the job are non-reactive.
- D. Normal Water-Reducing Admixture: ASTM C 494, Type A.
- E. Mid Range Water-Reducing Admixture: ASTM C 494, Type A.
- F. High-Range, Water-Reducing Admixture (Superplasticizer): ASTM C 494, Type F.
- G. High-Range Water-Reducing Admixture (Superplasticizer) for Self-Consolidating Concrete, ASTM C 494 Type F.
- H. Viscosity Modifying Admixture for Self-consolidating Concrete:
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Visctrol" or "Eucon ABS," Euclid Chemical Co.
 - b. "Rheomac VMA Series," BASF Construction Chemicals.
 - c. "Sika Stabilizer Series," Sika Corporation.
 - d. "AWA-C61," Russ Tech Admixtures, Inc.
 - e. "V-MAR," W.R. Grace & Co.
- I. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
- J. Air Entraining Admixture: ASTM C260.

- K. Non-Chloride, Non-Corrosive Water-Reducing, Accelerating Admixture: ASTM C 494, Type C or E.
1. Products: Subject to compliance with requirements, provide one of following:
 - a. "Eucon AcN-Series," "Accelguard 80," "Accelguard NCA," or "Accelguard 90," by Euclid Chemical Company.
 - b. "DCI," "PolaraSet," "Lubricon NCA," "Daraset" or "Gilco," by W.R. Grace & Co.
 - c. "Pozzutec 20+" or "Pozzolith NC 534," by BASF Construction Chemicals.
 - d. "Sika Set NC," "Plastocrete 161FL," or "Sika Rapid-1," by Sika Corporation.
 - e. "Catexol 2000 RHE," by Axim Concrete Technologies.
 - f. "Polychem NCA" or "Polychem Super Set," General Resource Technology.
 - g. "LCNC-166," Russ Tech Admixtures, Inc.
- L. Water-Reducing or Retarding Admixture: ASTM C 494, Type D or B.
1. Products: Subject to compliance with requirements, provide one of following:
 - a. "Eucon Retarder-75," "Eucon DS" or "Eucon W.O." Euclid Chemical Co.
 - b. "Daratard-17" or "Recover," W.R. Grace & Co.
 - c. "Pozzolith Series" or "Delvo Series," BASF Construction Chemicals.
 - d. "Sikatard Series," or "Plastiment Series" or "Plastocrete Series," Sika Corporation.
 - e. "Polychem R," General Resource Technology.
 - f. "LC-400 Series" or "LC-500 Series," Russ Tech Admixtures, Inc.
- M. Corrosion Inhibiting Admixture shall be capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Eucon CIA" or "Eucon BCN," Euclid Chemical Company.
 - b. "DCI" or "DCI-S," W.R. Grace.
 - c. "Rheocrete CNI," BASF Construction Chemicals.
 - d. "Sika CNI," Sika Corporation.
 - e. "Catexol 1000 CN-Cl," Axim Concrete Technologies.
 - f. "Polychem CI," General Resource Technology.
 - g. "Russ Tech RCI," Russ Tech Admixtures, Inc.
 2. Add at rate of 3 gal/cu yd of concrete, which shall inhibit corrosion to 9.9 lb of chloride ions per cu. yd. of concrete. Calcium Nitrite based corrosion inhibitor shall have a concentration of 30 percent, plus or minus 2 percent of solids content.
- N. Shrinkage Compensating Admixture:
1. Design requires using materials with combined drying shrinkage characteristic of 0.04 percent maximum at 28 days. Concrete Mixture(s), using actual

aggregates, admixtures and cement of the mix for Project as detailed herein and in Drawings, shall meet criteria. Submit ASTM C 157 (may be modified by curing period duration) results for at least 3 specimens. Test takes 28 days minimum. Begin tests as soon as possible so final test results available for submittal to Engineer.

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

2.5 FIBER REINFORCEMENT

A. Micro-Fiber: **Monofilament or fibrillated** polypropylene micro-fibers complying with ASTM C 1116, Type III, minimum 0.75 inches long.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Monofilament Micro-Fibers: Minimum dosage rate 1.0 pound per cubic yard of concrete.
 - 1) "Durafiber," Industrial Systems, Ltd.
 - 2) "Fibermesh 150," Propex Concrete Systems.
 - 3) "Fiberstrand 100," Euclid Chemical Co.
 - 4) "Grace Microfibers," W.R. Grace & Co., Inc.
 - 5) "MasterFiber M100," BASF Construction Chemicals.
 - 6) "Mighty-Mono," Forta Corp.
 - 7) "Polymesh," General Resource Technology.
 - 8) "Sika Fibers PPM," Sika Corporation.
 - b. Fibrillated Micro-Fibers: Minimum dosage rate 1.5 pounds per cubic yard of concrete.
 - 1) "Fibermesh 300," Propex Concrete Systems.
 - 2) "Grace Fibers," W.R. Grace & Co., Inc.
 - 3) "MasterFiber F100," BASF Construction Chemicals.
 - 4) "Sika Fibers PPF," Sika Corporation.

B. Macro-Fiber: Polyolefin macro-fibers complying with ASTM C 1116, Type III, minimum 1.5 inches long, minimum tensile strength 73 ksi, minimum Modulus of Elasticity 620 ksi.

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

- a. "Forta Ferro," Forta Corp. Minimum dosage rate 5.0 pounds per cubic yard of concrete.
 - b. "Novomesh 950," Propex Concrete Systems. Minimum dosage rate 7.5 pounds per cubic yard of concrete.
 - c. "Strux 90/40 Structural Synthetic Fibers," W.R. Grace & Co., Inc. Minimum dosage rate at 3.5 pounds per cubic yard of concrete.
 - d. "Tuf-Strand SF," Euclid Chemical Co. Minimum dosage rate at 5.0 pounds per cubic yard of concrete.
2. Conform to ASTM C 1399 and have a minimal residual strength performance of level 3 at 2 mm of beam deflection.
- C. Do not change volume of water used in mix when fibers are used. Offset any slump loss due to addition of fibers by addition of superplasticizer.
- D. Conform to manufacturer's recommendations for quantity of fibers if higher than the minimum dosage rates.
- E. See Drawings for locations of allowable use.
- F. Fiber manufacturer or approved distributor: Provide services of qualified representative at pre-construction meeting, concrete pre-installation meeting and first concrete placement containing fibers.

2.6 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry. Materials must be free of harmful substances, such as sugar or fertilizer, or substances that may discolor the concrete. To remove soluble substances, burlap should be thoroughly rinsed in water before placing it on the concrete.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- F. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- G. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.7 CONCRETE MIXES

- A. Comply with ACI 301 requirements for concrete mixtures.
- B. Prepare design mixes, proportioned according to ACI 301, for **normal-weight** concrete determined by either laboratory trial mix or field test data bases, as follows:
 - 1. Compressive Strength (28 Days): **5000 psi (34.5 MPa)**.
 - 2. Maximum w/cm ratio: See Drawing Notes.
 - 3. Air Content: See Drawing Notes.
 - 4. Maximum Permissible Cementitious Material Content:
 - a. Fly Ash: 25 per cent
 - b. Slag: 50 per cent
 - c. Silica Fume: 10 per cent
 - d. Fly Ash plus Slag plus Silica Fume: 50 per cent
 - e. Fly Ash plus Silica Fume: 35 per cent
 - 5. Slump: 4 inches (100 mm).
 - a. Slump Limit for Concrete Containing High-Range Water-Reducing Admixture: Not more than 8 inches (200 mm) after adding admixture to plant- or site-verified, 2- to 3-inch (50- to 75-mm) slump.
 - 6. Slump Flow: Per ASTM C1611. Non-segregating, between 24 and 28 inches flow. Workability, pumpability, finishability, and setting time of the mix design shall be verified with a successful test placement onsite.
 - 7. Density per ASTM C567: **115 lbs/ft³**

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with ASTM C 94 and ASTM C 1116.
 - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
 - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

2.9 MATERIAL ACCESSORIES

- A. Extended Open Time Epoxy Bonding Agent: Three component, water based, epoxy modified portland cement bonding agent and corrosion inhibitor coating providing the recommended Manufacturer's open time in which to apply repair mortar. Product shall be capable of achieving bond strength of 2,700 psi per ASTM C 882.
1. Acceptable materials for this Work are:
 - a. "Duralprep A.C." by The Euclid Chemical Company, Cleveland, OH.
 - b. "Sika Armatec 110 EpoCem", by Sika Corporation, Lyndhurst, NJ.
- B. Epoxy Adhesive: 2 or 3 component, 100 percent solids, 100 percent reactive compound suitable for use on dry or damp surfaces. Product shall be capable of achieving bond strength of 1,800 psi per ASTM C 882.
1. Acceptable materials for this Work are:
 - a. "MasterEmaco P 124" or "MasterEmaco ADH 326," by BASF Construction Chemicals, Shakopee, MN.
 - b. "Kemko 001 or 008", by ChemCo Systems, Inc., Redwood City, CA.
 - c. "Euco #452 Epoxy Series," or "Duralcrete Epoxy Series", by The Euclid Chemical Company, Cleveland, OH.
 - d. Sikadur 32 Hi-Mod LPL", by Sika Corporation, Lyndhurst, NJ.
- C. Joint Fillers
1. Joint filler in slabs and curbs per ASTM D1751 Asphalt impregnated fiber board; as shown on Drawings. Acceptable products as follows:
 - a. "Flexcell," Knight-Celotex Corp.
 - b. "Fibre Expansion Joint," W.R. Meadows, Inc.
 2. Joint filler used vertically to isolate walls from columns or other walls: White molded polystyrene beadboard type.
 3. Joint cover used to bridge gap between columns and grade walls, retaining walls, or basement walls: Minimum width: Gap width plus 4 in. For gaps over 3 in. wide, protect cover with protection board sized to span gap satisfactorily. Acceptable products:
 - a. "Sealtight Premoulded Membrane Vapor Seal," W.R. Meadows, Inc., Elgin, Illinois.
 - b. "Sealtight Melgard," W.R. Meadows, Inc., Elgin, Illinois and shall be applied according to manufacturer's instructions.

2.10 TOOLS

- A. Slab Jointing
1. Concrete groovers: For tooled joints in concrete:

- a. For concrete not exceeding 4 in. thickness, use groover with 1 in. deep v-cut bit, 0.5 in. surface width and 3/16 in. to 1/4 in. edge radius.
 - b. For concrete exceeding 4 in. thickness, use groover with 1.5 in. deep v-cut bit, 0.5 in. surface width and 3/16 in. to 1/4 in. edge radius.
2. Saw Cut Joints:
- a. Acceptable tool: "Soff-Cut Saw Model 310" or "Model G2000," Soff-Cut International, Corona, CA.
 - 1) Cut joint as soon as concrete will support weight of operator and saw without deforming.
 - 2) Joint shall be 1 in. deep for concrete thickness of 4 in. or less. Joint shall be 1.5 in. deep for concrete exceeding 4 in. thickness. Do not cut reinforcement.
 - 3) Extend joint to adjacent vertical surface within 30 minutes of cutting.
 - 4) Retool or grind sawcut joint before installing sealant to provide equivalent dimensions, shape and volume as joint obtained by tooled joint. Surface width shall be 0.5 in. with 3/16 to 1/4 in. edge radius.
- B. All joints subject to acceptance by sealant installer. Concrete contractor to rework rejected joints until acceptable to sealant installer.

PART 3 - EXECUTION

3.1 PRECONSTRUCTION MEETING

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

3.2 FORMWORK

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

3.3 STEEL REINFORCEMENT

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

3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Locate and install so as not to impair strength or appearance of concrete, at locations indicated or as approved by Engineer.

- C. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint filler full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

3.5 CONCRETE PLACEMENT

- A. Comply with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.
- B. Do not add water to concrete during delivery, at Project site, or during placement.
- C. Consolidate concrete with mechanical vibrating equipment.

3.6 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch (6 mm) in height rubbed down or chipped off.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.7 FINISHING NON-FORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on the surface.
 - 1. Do not further disturb surfaces before starting finishing operations.
- C. Nonslip Broom Finish: Apply a nonslip broom finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.8 TOLERANCES

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

3.9 CONCRETE PROTECTION AND CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305R for hot-weather protection during placement. Keep concrete continually moist prior to final curing by evaporation retarder, misting, sprinkling, or using absorptive mat or fabric covering kept continually moist.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.1 lb/sq. ft. x h before and during finishing operations. Apply material according to manufacturer's written instructions one or more times after placement, screeding and bull floating concrete, but prior to float finishing. Repeated applications are prohibited after float finishing has begun.
 - 1. Acceptable evaporation retarder materials for this Work are:
 - a. "Cimfilm", by Axim Concrete Technologies.
 - b. "MasterKure ER 50," by BASF Construction Chemicals, Shakopee, MN.
 - c. "Aquafilm", by Conspec Marketing & Manufacturing Co., Inc.
 - d. "Sure-Film (J-74)", by Dayton Superior Corporation.
 - e. "Eucobar", or "Tamms Surface Retarder", by The Euclid Chemical Company, Cleveland, OH.
 - f. "E-Con", by L&M Construction Chemicals, Inc.
 - g. "EVRT", by Russ Tech Admixtures, Inc.
 - h. "SikaFilm", by Sika Corporation, Lyndhurst, NJ.
- C. Immediate upon conclusion of finishing operation cure concrete in accordance with ACI 308 for duration of at least seven days by moisture curing or moisture retaining covering. **Dissipating curing compounds complying with ASTM C309 may be used in accordance with recommendations of ACI 506.7, "Specification for Concrete."** Provide additional curing immediately following initial curing and before concrete has dried.
 - 1. Continue method used in initial curing.
 - 2. Material conforming to ASTM C171.
 - 3. Other moisture retaining covering as approved by Engineer/Architect.
 - 4. During initial and final curing periods maintain concrete above 50°.
 - 5. Prevent rapid drying at end of curing period.
- D. Concrete surfaces to receive slab coatings or penetrating sealers shall be cured with moisture curing or moisture-retaining cover. **Concrete surfaces may be cured by sealer/coating manufacturer recommended dissipating resin curing compound, complying with ASTM C309 and in accordance with ACI 506.7.**

- E. Dissipating Curing Compound [(VOC Compliant, less than 350 g/l)]: Comply with ASTM C 309, Type 1, Class A or B. Moisture loss shall be not more than 0.55 kg/m² when applied at 200 sq. ft/gal. Manufacturer's certification is required. Silicate based compounds are prohibited.
1. Subject to project requirements provide one of the following products:
 - a. "Kurez DR VOX" or "Kurez RC," or "Kurez RC Off," The Euclid Chemical Company.
 - b. "RxCure WB," or "RxCure VOC" or "W.B. Cure VOC," Conspec Marketing & Manufacturing.
 - c. "MasterKure CC 200 WB" or "MasterKure CC 160 WB," BASF Construction Chemicals.
 2. Additional requirements:
 - a. With product submittal provide plan and procedures for removal of residual curing compound prior to application of sealers, coatings, stains, pavement markings and other finishes.
 - b. Provide a summary of testing to show adequate surface preparation for successful application of sealers, coatings, stains, pavement markings, and other finishes.
- F. Curing Methods: Cure formed and non-formed concrete moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: **Contractor** shall engage a qualified independent testing and inspecting agency acceptable to the Engineer to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article. Perform tests according to ACI 301.

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
2. Determine strength at **3, 7, and 28** days. Each test shall consist of two 6-inch diameter cylinders or three 4-inch diameter cylinders. Testing shall be in accordance with ASTM C39.

3.11 EVALUATION AND ACCEPTANCE OF WORK

A. Acceptance of Repairs (ACI 301):

1. Acceptance of completed concrete Work will be according to provisions of ACI 301.
2. Repair areas shall be sounded by Engineer and Contractor with hammer or rod after curing for 72 hours. Contractor shall repair all hollowness detected by removing and replacing patch or affected area at no extra cost to Owner.
3. If shrinkage cracks appear in repair area when initial curing period is completed, repair shall be considered defective, and it shall be removed and replaced by Contractor at no extra cost.

END OF SECTION 033021

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SECTION 03 37 50 - LATEX MODIFIED CONCRETE AND MORTAR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the provision of all labor, materials, and equipment necessary for production and installation of latex modified concrete or mortar for patching floor spalls and overlays.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Submittal Procedures."
 - 2. Division 02 Section "General Concrete Surface Preparation."
 - 3. Division 02 Section "Surface Preparation for Patching and Overlay."
 - 4. Division 03 Section "Cast-in-Place Concrete - Restoration."
 - 5. Division 07 Section "Concrete Joint Sealants".

1.3 QUALITY ASSURANCE

- A. Work shall conform to requirements of ACI 301 and ACI 318 except where more stringent requirements are shown on Drawings or specified in this Section.
- B. Testing Agency:
 - 1. Independent testing laboratory employed by Contractor and acceptable to Engineer/Architect.
 - 2. Accredited by AASHTO under ASTM C1077. Testing laboratory shall submit documented proof of ability to perform required tests.
- C. Sampling and testing of concrete and mortar shall be performed by ACI certified Concrete Field Technicians Grade I. Certification shall be no more than 3 years old.
- D. Testing Agency is responsible for conducting, monitoring and reporting results of all tests required under this Section. Testing Agency has authority to reject concrete or mortar not meeting Specifications.
- E. Proportioning, production, placement and finishing of latex modified concrete or mortar shall be overseen by, and have approval of, latex manufacturer. Latex admixture supplier shall make available qualified individual experienced in placement of latex modified concrete overlays, to aid Contractor during placement of all latex modified

concrete overlay. Qualification of supplier's representative shall be acceptable to Engineer/Architect.

- F. Contractor shall have at least three years previous experience installing latex modified concrete overlays and shall have performed minimum of three projects of similar nature of at least 50,000 sq. ft. in size.
- G. Testing Agency shall submit following information for field testing of concrete unless modified in writing by Engineer/Architect:
1. Project name and location.
 2. Contractor's name.
 3. Testing Agency's name, address and phone number.
 4. Concrete supplier.
 5. Date of report.
 6. Testing Agency technician's name (sampling and testing).
 7. Placement location within structure.
 8. Concrete mix data (quantity and type):
 - a. Cement.
 - b. Fine aggregates.
 - c. Coarse aggregates.
 - d. Water.
 - e. Water/cement ratio.
 - f. Latex emulsion.
 - g. Latex emulsion per cu yd of concrete.
 - h. Other admixtures.
 9. Weather data:
 - a. Air temperatures.
 - b. Weather.
 - c. Wind speed.
 10. Field test data:
 - a. Date, time and place of test.
 - b. Slump.
 - c. Air content.
 - d. Unit weight.
 - e. Concrete temperature.
 11. Compressive test data:
 - a. Cylinder number.
 - b. Age of concrete when tested.
 - c. Date and time of cylinder test.
 - d. Curing time (field and lab).
 - e. Compressive strength.
 - f. Type of break.

1.4 REFERENCES

A. American Concrete Institute (ACI):

1. ACI 214, "Recommended Practice for Evaluation of Strength Test Results of Concrete."
2. ACI 301, "Standard Specifications for Structural Concrete ."
3. ACI 302.1R, "Guide for Concrete Floor and Slab Construction."
4. ACI 305R, "Hot Weather Concreting."
5. ACI 306R, "Cold Weather Concreting."
6. ACI 306.1, "Standard Specification for Cold Weather Concreting."
7. ACI 318, "Building Code Requirements for Reinforced Concrete."
8. ACI 347, "Recommended Practice for Concrete Formwork."

B. American Society for Testing and Materials (ASTM):

1. ASTM C31, "Method of Making and Curing Concrete Test Specimens in the Field."
2. ASTM C33, "Specification for Concrete Aggregates."
3. ASTM C39, "Test Method for Compressive Strength of Cylindrical Concrete Specimens."
4. ASTM C94, "Specification for Ready-Mixed Concrete."
5. ASTM C109, "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)."
6. ASTM C138, "Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete."
7. ASTM C143, "Test Method for Slump of Portland Cement Concrete."
8. ASTM C150, "Specification for Portland Cement."
9. ASTM C172, "Method of Sampling Freshly Mixed Concrete."
10. ASTM C173, "Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method."
11. ASTM C231, "Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method."
12. ASTM C260, "Specification for Air-Entraining Admixtures for Concrete."
13. ASTM C494, "Specification for Chemical Admixtures for Concrete."
14. ASTM C685, "Specification for Concrete Made by Volumetric Batching and Continuous Mixing."
15. ASTM C1040, "Standard Test Method for Density of Unhardened and Hardened Concrete by Nuclear Methods."
16. ASTM C1077, "Standard Practice for Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation."
17. ASTM C1218, "Sampling and Testing for Water Soluble Chloride Ion in Concrete and Concrete Raw Materials."

C. Concrete Reinforcing Steel Institute (CRSI):

1. CRSI MSP, "Manual of Standard Practice."

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

1. ACI SP-15, "Standard Specifications for Structural Concrete ACI 301 with selected ACI and ASTM References."
2. ACI 302.1R, "Guide for Concrete Floor and Slab Construction."
3. ACI 305R, "Hot Weather Concreting."
4. ACI 306R, "Cold Weather Concreting."
5. ACI 306.1, "Standard Specification for Cold Weather Concreting."

1.5 SUBMITTALS

- A. Make submittals in accordance with requirements of Division 01 of this Specification, and as herein specified.
- B. Contractor shall submit concrete mix design reviewed and approved by latex manufacturer to Engineer/Architect 2 weeks prior to placing concrete. Use mix design submittal form included at end of this Section. Proportion mix designs as defined in ACI 301, 4.2.3. Include following information for each concrete mix design:
 1. Method used to determine mix design (per ACI 301, 4.2.3).
 2. Gradation of fine and coarse aggregates: ASTM C33.
 3. Proportions of all ingredients including all admixtures added either at time of batching or at job site.
 4. Water-cement ratio.
 5. Slump: ASTM C143.
 6. Certification of chloride content of admixtures.
 7. Air content of freshly mixed concrete by pressure method, ASTM C231.
 8. Unit weight of concrete: ASTM C138.
 9. Strength at 3 and 28 days.
 10. Water soluble chloride ion content of concrete per ASTM C1218.
- C. Contractor: At pre-concrete meeting, submit procedures to protect fresh concrete from rain and hot and cold weather conditions.
- D. Testing Agency: Promptly report all concrete test results to Engineer/Architect, Contractor and concrete supplier. Include following information:
 1. See Article "Quality Assurance," paragraph "Testing Agency shall submit...."
 2. Weight of concrete, ASTM C138.
 3. Slump, ASTM C143.
 4. Air content of freshly mixed concrete by pressure method, ASTM C231 or volumetric method, ASTM C173.
 5. Concrete temperature (at placement time).
 6. Air temperature (at placement time).
 7. Strength determined in accordance with ASTM C39.
- E. Concrete batched on-site shall be placed and finished within 30 minutes of adding water to mixture.
- F. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.

- G. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aggregates (ACI 301, Article 4.2.1):
1. Normal weight concrete aggregates:
 - a. Coarse aggregate: Crushed and graded limestone or approved equivalent conforming to ASTM C33, Class Designation 5S.
 - b. Fine aggregate: Natural sand conforming to ASTM C33 and having preferred grading shown for normal weight aggregate in ACI 302.1R, Table 4.2.1.
 2. Coarse aggregate: Nominal sizes indicated below, conforming to ASTM C33, Table 2:
 - a. 0.375 in. for patch cavities 0.75 to 1.5 in. deep.
 - b. 0.5 in. for patch cavities greater than 1.5 in. deep and overlay work. For overlays limit maximum size of aggregates to one-third nominal thickness of overlay.
 3. Chloride Ion Level: Chloride ion content of aggregates shall be tested by laboratory making trial mixes. Also, total water soluble chloride ion content of mix including all constituents shall not exceed 0.06% chloride ions by weight of cement for prestressed concrete, and 0.15% chloride ions by weight of cement for reinforced concrete. Test to determine chloride ion content shall conform to Test Method ASTM C1218.
- B. Cement (ACI 301, 4.2.1.1):
1. Portland cement, Type I, ASTM C150. Use 1 cement clinker source throughout project. No change in brand without prior written approval from Engineer/Architect.
- C. Water (ACI 301, 4.2.1.3):
1. ASTM C94.
- D. Latex Emulsion:
1. "Dow Reichhold Modifier A/NA, Dow Reichhold Specialty Latex LLC, Research Triangle Park, N.C.
 2. "Styrofan 1186," BASF Corporation, Chattanooga, TN.
 3. Or Engineer approved equal submitted prior to bidding.

- E. Admixtures (ACI 301, 4.2.1.4):
1. Only admixtures listed shall be acceptable. Do not submit alternates.
 2. Concrete supplier and manufacturer shall certify compatibility of all ingredients in each mix design.
 3. Use admixtures in strict accordance with manufacturer's recommendations.
 4. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.5% chloride ions, by weight of admixture, are not permitted. Additionally, each admixture shall not contribute more than 5 ppm, by weight, of chloride ions to total concrete constituents.
- F. Storage of Materials (ACI 301, 4.1.4).

2.2 CONCRETE MIX DESIGN

- A. Selection of concrete proportions shall be in accordance with ACI 301, 4.2.3.1. Before any concrete is placed for project, Contractor shall submit to Engineer/Architect data showing method used for determining concrete mix design, including fine and coarse aggregate gradations, proportions of all ingredients, water-cement ratio, slump, air content, cylinder breaks and other required data specified in Article "Submittals," second para, for each different concrete type specified. Mix design shall meet following minimum requirements:

Compressive Strength	4500 psi @ 28 days (2500 psi @ 3 days)
Water-Cement Ratio	0.25 to 0.40
Latex Content Per Sack of Cement	3.5 gal.
Slump*	4 in. ± 2 in.
Cement Content	658-800 lb./c.y.
Air Content	Less than 6.5%

*For concrete placed by vibratory screeds, slump shall not exceed 4 in. at point of deposit.

- B. Chloride Ion Level: See Article "Materials," paragraph "Chloride Ion Level."
- C. Bonding Grout: Bonding grout shall consist of sand, cement, and latex emulsion in proportions similar to mortar in concrete with sufficient water to form stiff slurry to achieve consistency of "pancake batter."

PART 3 - EXECUTION

3.1 PRODUCTION OF MORTAR OR CONCRETE

- A. Production of latex modified mortar or concrete shall be in accordance with requirements of ACI 301, 4.3.1, except as otherwise specified herein.

- B. Concrete or mortar, mixed at site, shall be proportioned by continuous mixer used in conjunction with volumetric proportioning. Volumetric batching/continuous mixers shall conform to ASTM C685. In addition, self-contained, mobile, continuous type mixing equipment shall comply with following:
1. Mixer shall be capable of producing batches of not less than 6 cu yds.
 2. Mixer shall be capable of positive measurement of cement being introduced into mix. Recording meter visible at all times and equipped with ticket printout shall indicate this quantity.
 3. Mixer shall provide positive control of flow of water into mixing chamber. Water flow shall be indicated by flowmeter and shall be readily adjustable to provide for minor variations in aggregate moisture.
 4. Mixer shall be capable of being calibrated to automatically proportion and blend all components of indicated composition on continuous or intermittent basis, as required by finishing operation, and shall discharge mixed material through conventional chute into transporting device or directly in front of finishing machine. Sufficient mixing capacity of mixers shall be provided to permit intended pour to be placed without interruption.
 5. Mixer shall be calibrated to accurately proportion specified mix. Yield is required to be within tolerance of 1.0 %.
- C. On-site mortar or concrete batching in mixer of at least 0.125 cu yd capacity shall be permitted only with approval of Engineer/Architect. On-site concrete batching and mixing shall comply with requirements of ACI 301, 4.3.1.

3.2 PREPARATION (ACI 301, 5.3.1)

- A. Cavity surfaces shall be clean and dry prior to commencement of patch or overlay installation. Preparation of surfaces to receive new concrete shall be in accordance with Section "Surface Preparation for Patching and Overlay."
- B. Bonding Grout:
1. Bonding grout shall be applied to damp (but not saturated) concrete surface in uniform thickness of 0.0625 in. to 0.125 in. over all surfaces to receive patching or overlay.
 2. Grout shall not be allowed to dry or dust prior to placement of patch or overlay material. If concrete placement is delayed and the coating dries, cavity or surface shall not be patched or overlaid until it has been recleaned and prepared as specified in Section "Surface Preparation for Patching and Overlay." Grout shall not be applied to more area than can be patched or overlaid within 0.5 hr by available manpower.
- C. Receive Owner's and Engineer/Architect's written approval of concrete surface finish used on flatwork before beginning of construction.

3.3 INSTALLATION

A. Placing (ACI 301, 5.3.2):

1. Do not place concrete when temperature of surrounding patch area or air is less than 50° F. unless following conditions are met:
 - a. Place concrete only when temperature of surrounding air is expected to be above 45° F. for at least 36 hours.
 - b. When above conditions are not met, concrete may be placed only if insulation or heating enclosures are provided in accordance with ACI 306, "Recommended Practice for Cold Weather Concreting." Submit measures in writing for Engineer/Architect's review prior to concrete placement.
 - c. Cost for precautionary measures required shall be borne by Contractor.
2. Concrete shall be manipulated and struck off slightly above final grade. Concrete shall then be consolidated and finished to final grade with internal and surface vibration devices. Contractor's preferred consolidation method shall be submitted for Engineer/Architect's review prior to concrete placement.
 - a. Do not place concrete if mix temperature exceeds 85° F.
 - b. Do not place concrete under hot weather conditions. Hot weather is defined as air temperature which exceeds 80° F. or any combination of high temperature, low humidity and high wind velocity which causes evaporation rates in excess of 0.10 psf per hr as determined by ACI 305R, Figure 2.1.5.
3. Fresh concrete 3 in. or more in thickness shall be vibrated internally in addition to surface vibration.
4. Concrete shall be deposited as close to its final position as possible. All concrete shall be placed in continuous operation and terminated only at bulkheads or designated control or construction joints.
5. On ramps with greater than 5 % slope, all concreting shall begin at low point and end at high point. Contractor shall make any necessary adjustment to slump or equipment to provide wearing surface without any irregularities or roughness.

B. Finishing (ACI 301, 5.3):

1. Flatwork (BROOM Finish, 5.3.4.2.d):
 - a. When tight and uniform concrete surface has been achieved by screeding and finishing operation, give slab surface coarse transverse scored texture by drawing broom across surface. Texture shall be accepted by Owner and Engineer/Architect from sample panels.
 - b. Finishing tolerance: ACI 301, 5.3.4.2; Class B tolerance.
 - c. Finish all concrete surfaces to proper elevations to insure that all surface moisture will drain freely to floor drains, and that no puddle areas exist. Contractor shall bear cost of any corrections to provide for positive drainage.

C. Joints in Concrete (ACI 301, 2.2.2.5):

1. Construction, control and isolation joints are located and detailed on Drawings:

- a. Tool joints at time of finishing. Sawcut joints are prohibited.
- b. Isolation joints - interrupt structural continuity resulting from bond, reinforcement or keyway.
- c. Coordinate configuration of tooled joints with control joint sealants.

D. Curing:

1. Latex modified mortar and concrete shall be cured according to latex manufacturer's recommendations and according to following minimum requirements:
 - a. Surface shall be covered with single layer of clean, wet burlap as soon as surface will support it without deformation. Cover burlap with continuous single thickness of polyethylene film for 24 hours.
 - b. After 24 hours remove polyethylene film and allow burlap to dry slowly for an additional 24 to 48 hours.
 - c. Remove burlap and allow concrete to air dry for an additional 48 hours.
 - d. Curing time shall be extended, as Engineer/Architect directs, when curing temperature falls below 50° F.

E. Repair of Defects (ACI 301, 5.3.7):

1. Repair all surface defects exceeding 0.25 in. width or depth.
2. Match color of concrete to be repaired.
3. Submit samples of materials and relevant literature and test data on proprietary compounds and procedures used for adhesion or patching ingredients to Engineer/Architect for its review before patching concrete.
4. Receive written approval of Engineer/Architect of method and materials prior to making repairs to concrete.

3.4 FIELD QUALITY CONTROL BY TESTING AGENCY (ACI 301, 1.6)

A. Air Content:

1. Sample freshly-mixed concrete per ASTM C172 and conduct 1 air content test per ASTM C231 or ASTM C173 for each 10 cu yds of concrete placed or each day's production, whichever is less.

B. Concrete Compressive Strength:

1. Mold test cylinders in accordance with ASTM C31 and test in accordance with ASTM C31 as follows:
 - a. Take minimum of 6 cylinders for each 25 cu yds or fraction thereof, of each mix design of concrete placed in any 1 day. Use of 4 in. x 8 in. cylinders in lieu of standard cylinders is acceptable.
 - b. Additional 2 cylinders shall be taken and field cured under conditions of cold weather concreting, and when directed by Engineer/Architect.

2. Cover specimens properly, immediately after finishing. Protect outside surfaces of cardboard molds, if used, from contact with sources of water for first 24 hours after molding.
 3. Fabricate and cure test cylinders per ASTM C31, except as follows:
 - a. To verify compressive strength, test cylinders required due to cold weather concreting conditions:
 - 1) Store test specimens on structure as near to point of sampling as possible and protect from elements in same manner as that given to portion of structure as specimen represents.
 - 2) Transport to test laboratory no more than 4 hours before testing. Remove molds from specimens immediately before testing.
 - b. To verify 28-day compressive strength:
 - 1) During first 24 hours after molding, store test specimens under conditions that maintain temperature immediately adjacent to specimens in range of 60 to 80° F. and prevent loss of moisture from specimens.
 - 2) Remove test specimens from molds at end of 20 ± 4 hours and store at 73 ± 3° F., 50 ± 4% relative humidity in laboratory until moment of test.
 4. Compression tests:
 - a. Test 2 cylinders at 3 days.
 - b. Test 2 cylinders at 28 days.
 - c. Hold 2 cylinders in reserve for use as Engineer/Architect directs.
 5. Unless notified by Engineer/Architect, reserve cylinders may be discarded without being tested after 56 days.
- C. Slump Test:
1. Conduct 1 slump test in accordance with ASTM C143 for each 10 yards of concrete placed, or each day's production, whichever is less.
- D. Yield and Proportioning Tests (ASTM C685):
1. When concrete placements involve more than 100 cu yds, accuracy of on-site batching equipment output indicators shall be verified at 50 cu yd intervals.
 2. Accuracy of on-site batching equipment proportioning of concrete mixture shall be verified at 100 cu yd intervals.
- E. Evaluation and Acceptance of Concrete (ACI 301, 1.6.7 and ACI 318, 4.7):
1. Concrete compression tests will be evaluated by Engineer/Architect in accordance with ACI 301, 1.6.7. If number of tests conducted is inadequate for evaluation of concrete or test results for any type of concrete fail to meet

specified strength requirements, core tests may be required as directed by Engineer/Architect.

2. Core tests, when required, per ACI 301, 1.6.7.3.
3. Should tested hardened concrete meet these specifications, Owner will pay for coring and testing of hardened concrete. Should tested hardened concrete not meet these specifications, concrete contractor will pay for coring and testing of hardened concrete and for any corrective action required for unaccepted concrete.

F. Acceptance of Structure (ACI 301,1.7):

1. Acceptance of completed concrete Work will be according to provisions of ACI 301, 1.7.
2. Patched and overlaid areas shall be sounded by Contractor with chain drag after curing for 7 days. Contractor shall repair all hollowness detected by removing and replacing patch or affected area at no extra cost to Owner.
3. If shrinkage cracks appear in overlay when initial 24 hours curing period is completed, overlay shall be considered defective, and it shall be removed and replaced by Contractor at no extra cost.

END OF SECTION 03 37 50

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**MIX DESIGN SUBMITTAL FORM
 LATEX MODIFIED CONCRETE**
 (Submit separate form for each mix design)

I. GENERAL INFORMATION	
Project:	City:
General Contractor:	
Mix Design Identification No.:	
Use (Describe) ⁽¹⁾ :	

⁽¹⁾ Overlay, Floor Patching, Beam Repairs, etc.

II. MIX DESIGN PREPARATION:		
Mix Design Based on (Check one):	Standard Deviation Analysis: or	Trial Mix Test Data:
Design Characteristics:	Density: _____ pcf;	Air: _____ %
	Strength: _____ psi (28 day);	Slump _____ in.

Latex Manufacturer Approval

Name: _____

Title: _____

Date: _____

WALKER ACCEPTANCE STAMP

III. MATERIALS:		
Aggregates: (size; type; source; gradation report; specification)		
Coarse:		
Fine:		
Other Materials:	Type	Product-Manufacturer (Source)
Cement:		
Latex Admixture:		
Other(s):		

IV. <u>MIX PROPORTIONS</u> (per yd³)		
	WEIGHT (lbs.)	ABSOLUTE VOL. (cu. ft.)
Cement:		
Fine Aggregate: ⁽¹⁾		
Coarse Aggregate: ⁽¹⁾		
Latex: ⁽²⁾		
Water: ⁽³⁾		
Other(s):		
TOTALS:		
NOTES: ⁽¹⁾ Based on saturated surface dry weights of aggregates. ⁽²⁾ Include only weight of solids portion of latex admixture. Confirm with manufacturer actual percentages of solids and water in suspension and coordinate with Note 3. ⁽³⁾ Includes ALL WATER , including added water, free water contained on aggregates, and <u>water suspension portion of latex admixture.</u>		

V. RATIOS	
Water ⁽⁴⁾ =	_____ lb.
Cement	_____ lb.
Fine Agg. =	_____ lb.
Total Agg	_____ lb.

VI. SPECIFIC GRAVITIES
Fine Aggregate
Coarse Aggregate

VII. ADMIXTURES		
Air Entraining Agent (A.E.A.):	_____ oz.	per 100# cement
Water Reducer	_____ oz.	per 100# cement
Latex Emulsion	_____ gal	per sack cement
Other(s)		

VIII. <u>STANDARD DEVIATION ANALYSIS:</u>	<u>Yes</u>	<u>N/A</u>
<u>(Complete this section only if mix design was developed using standard deviation analysis of previous project test results. If other method was used, check "N/A".)</u>		
<u>Number of Test Cylinders Evaluated:</u>	<u>Standard Deviation:</u>	
Mix Designs Proportioned to Achieve $f'_{cr} = f'_c + \underline{\hspace{2cm}}$ psi		
NOTE: Mix designs shall be proportioned to achieve f'_{cr} equal to or greater than the larger of $f'_{cr} = f'_c + 1.34s$ [s= calculated standard deviation] or $f'_{cr} = f'_c + 2.33s - 500$ (Refer to ACI 301 for increased deviation factor when less than 30 tests are available.)		

IX. TRIAL MIXTURE TEST DATA:		Yes	N/A
(Complete this section only if mix design is based on data from trial test mixture(s) batched by testing agency or Contractor. If other method was used, check "N/A".)			
<u>Age</u> (days)	<u>Trial Mix #1</u> (comp. str.)	<u>Trial Mix #2</u> (comp. str.)	<u>Trial Mix #3</u> (comp. str.)
<u>7</u>			
<u>7</u>			
<u>28</u>			
<u>28</u>			
28 day average compressive strength: _____ psi			
DESIGN MIX CHARACTERISTICS			
Slump = _____ in.		Air Content = _____ %	
Unit Wet Wt. = _____ pcf		Unit Dry Wt. = _____ pcf	
Mix Design Proportioned to Achieve: f'c + 1200 psi (1200 psi increases to 1400 psi when f'c > 5000 psi)			
ACTUAL MIX CHARACTERISTICS			
Initial Slump = _____ in.		Final Slump _____ in.	
Unit Wet Wt.= _____ pcf.		Unit Dry Wt. = _____ pcf	
Air Content = _____ %			

X. <u>OTHER REQUIRED TESTS</u>
Soluble Chloride Ion Content of mix: _____ % by weight of cement (Water soluble by ASTM 1218 OR AASHTO T260)

XI. <u>Remarks:</u>

Submitted by:

Latex Modified Concrete Supplier
Name: _____
Address: _____
Phone Number: _____
Date: _____

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

Signature _____

Typed or Printed Name _____

REQUIRED ATTACHMENTS	
	Coarse aggregate grading report
	Fine aggregate grading report
	Concrete compressive strength data used for standard deviation calculations
	Chloride ion data and related calculations
	Admixture compatibility certification letter

INSTRUCTIONS:

1. Fill in all blank spaces. Use -0- (Zero) or N.A. (Not Applicable) where appropriate. See "Design and Control of Concrete Mixtures: 13th Edition by Portland Cement Association, for assistance in completing this form.
2. Provide the necessary documentation to support any laboratory test results or compliance to standard ASTM test methods or specifications referenced in the mix design submittal form.
3. If mix design utilizes multiple aggregate material sources, submit chloride ion content test data of each component from material suppliers. Test data shall be not more than 1 yr old.

Attach letter of certification that all admixtures, including latex admixture, are compatible for this mix design.

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SECTION 03 37 60 – PREPACKAGED REPAIR MORTAR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the provision of all labor, materials, supervision and incidentals necessary to prepare deteriorated or damaged concrete surfaces and install prepackaged concrete repair mortar to formed horizontal, vertical and overhead surfaces to restore original surface condition and integrity.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Submittal Procedures."
 - 2. Division 02 Section "General Concrete Surface Preparation."
 - 3. Division 02 Section "Surface Preparation for Patching and Overlay."
 - 4. Division 03 Section "Cast-In-Place Concrete - Restoration."
 - 5. Division 07 Section "Concrete Joint Sealants."
 - 6. Division 07 Section "Traffic Coatings."

1.3 QUALITY ASSURANCE

- A. Work shall conform to requirements of ACI 301 as applicable except where more stringent requirements are shown on Drawings or specified in this Section.
- B. Testing Agency:
 - 1. Independent testing laboratory employed by Owner and acceptable to Engineer.
 - 2. Accredited by AASHTO under ASTM C1077. Testing laboratory shall submit documented proof of ability to perform required tests.
- C. Sampling and testing of mortar shall be performed by ACI certified Concrete Field Technicians Grade I. Certification shall be no more than three years old.
- D. Testing Agency is responsible for conducting, monitoring and reporting results of all tests required under this Section. Testing Agency has authority to reject mortar not meeting Specifications. Testing Agency does not have the authority to accept mortar that does not meet specifications.
- E. Testing Agency shall submit the following information for Field Testing of Concrete unless modified in writing by Engineer:

1. Project name and location.
2. Contractor's name.
3. Testing Agency's name, address and phone number.
4. Mortar manufacturer.
5. Date of report.
6. Testing Agency technician's name (sampling and testing).
7. Placement location within structure.
8. Weather data:
 - a. Air temperatures.
 - b. Weather.
 - c. Wind speed.
9. Date, time, and place of test.
10. Compressive test data:
 - a. Cube or cylinder number.
 - b. Age of sample when tested.
 - c. Date and time of test.
 - d. Compressive strength.

1.4 REFERENCES

- A. "Standard Specification for Structural Concrete" (ACI 301) by American Concrete Institute, herein referred to as ACI 301, is included in total as specification for this structure except as otherwise specified herein.
- B. Comply with provisions of following codes, specifications and standards except where more stringent requirements are shown on Drawings or specified herein:
 1. "Building Code Requirements for Structural Concrete" (ACI 318), American Concrete Institute, herein referred to as ACI 318.
 2. "Specification for Hot Weather Concreting," ACI 305.1.
 3. "Standard Specification for Cold Weather Concreting," ACI 306.1.
 4. "Standard Specification for Curing Concrete" (ACI 308.1)
- C. Contractor shall have following ACI publications at Project construction site at all times:
 1. "Standard Specifications for Structural Concrete (ACI 301) with Selected ACI and ASTM References," ACI Field Reference Manual, SP15.
 2. "Specification for Hot Weather Concreting," ACI 305.1.
 3. "Standard Specification for Cold Weather Concreting," ACI 306.1.
- D. ASTM International (ASTM):
 1. ASTM C109, "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)."
 2. ASTM C31, "Test Method for Compressive Strength of Cylindrical Concrete Specimens."

3. ASTM C1583, "Standard Test Method for the Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)"

1.5 SUBMITTALS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 MATERIALS

- A. Horizontal Repair and Form and Pour Mortar: Shall be prepackaged cementitious repair mortar capable of horizontal and form and pour partial depth applications, achieving a minimum 3,000 psi compressive strength at 7 days and 5,000 psi compressive strength at 28 days per ASTM C39 as certified by manufacturer with maximum lineal shrinkage of 0.10% at 28 days. Extend per manufacturer's instructions as required for deeper placements.
 1. Acceptable cementitious repair materials for this Work are as follows:
 - a. "MasterEmaco S440," by BASF Corporation.
 - b. "Eucocrete," by Euclid.

- c. "FA-S10 Concrete," by King.
 - d. "Planitop 11," by MAPEI.
 - e. "Sikacrete 211," by Sika.
 - f. Other types may be used only with Engineer's approval in writing prior to bidding.
 2. Acceptable polymer modified materials for this Work are as follows:
 - a. "MasterEmaco T310 CI" by BASF Corporation.
 - b. "Sika Repair 222 with Latex R," "SikaTop 111 Plus", or "Sikacrete 211 SCC+," by Sika
 - c. "Duraltop" by Euclid
 - d. Form-Flo P-38 by Tomes
 - e. Other types may be used only with Engineer/Architect's approval in writing prior to bidding.
- B. Horizontal Repair and Form and Pour Mortar for use with Galvanic Anodes: Shall be prepackaged cementitious repair mortar capable of horizontal and form and pour partial depth applications, achieving a minimum 3,000 psi compressive strength at 7 days and 5,000 psi compressive strength at 28 days per ASTM C39 as certified by manufacturer with maximum linear shrinkage of 0.10% at 28 days.. Manufacturer shall provide written certification of compatibility with galvanic anode corrosion protection system. Extend per manufacturer's instructions as required for deeper placements.
 1. Acceptable materials for this Work are as follows:
 - a. "MasterEmaco S440," by BASF Corporation.
 - b. "EucoRepair CP," by Euclid.
 - c. "FA-S10 Concrete," by King.
 - d. "Sikacrete 211," by Sika.
 - e. "Form Flo P-38," by Tomes.
 - f. Other types may be used only with Engineer's approval in writing prior to bidding.
- C. Rapid Strength Repair Mortar: Shall be prepackaged, cementitious repair mortar. Repair mortar shall be capable of application achieving a minimum 3,500 psi compressive strength at 1 day and 5,000 psi compressive strength at 28 days per ASTM C39 as certified by manufacturer. Extend per manufacturer's instructions as required for deeper placements.
 1. Acceptable materials for this Work are as follows:
 - a. "MasterEmaco T430," by BASF Corporation.
 - b. "Speedcrete 2028," by Euclid.
 - c. "HP-S10 Concrete," by King.
 - d. "Planitop 18 ES" by MAPEI.
 - e. "Sikaquick 1000," by Sika.
 - f. "Aprisa P-80," by Tomes.
 - g. Other types may be used only with Engineer's approval in writing prior to bidding.

D. Trowel Applied Repair Mortar: Shall be prepackaged, cementitious repair mortar capable of vertical/overhead application by trowel achieving a minimum 3,000 psi compressive strength at 7 days and 4,500 psi compressive strength at 28 days per ASTM C 109 as certified by manufacturer.

1. Acceptable materials for this Work are as follows:

- a. "MasterEmaco N425," by BASF Corporation.
- b. "Verticoat Supreme," by Euclid.
- c. "Super-Top," by King.
- d. "Planitop XS," by MAPEI
- e. "Sikaquick VOH," by Sika.
- f. "CT-40 Do All Mortar," by Tomes.
- g. Other types may be used only with Engineer's approval in writing prior to bidding.

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

- a. "MasterEmaco N 400 RS," "MasterEmaco N 400," "MasterEmaco N 426," or "MasterEmaco N 300 CI" by.
- b. "Verticoat," "Speedcrete PM," or "Duraltop Gel" by The Euclid.
- c. "SikaRepair 223 with Latex R", "SikaRepair SHB with Latex R", or "SikaRepair SHA with Latex R," by.
- d. "Super-Top OV" by King
- e. Other types may be used only with Engineer's approval in writing prior to bidding.

E. Horizontal Topping Mortar: Shall be prepackaged cementitious repair mortar capable of horizontal partial depth applications on minimum thickness of 0.5 inches and a maximum thickness of 2 inches, achieving a minimum 3,000 psi compressive strength at 7 days and 5,000 psi compressive strength at 28 days per ASTM C109 as certified by manufacturer. The mortar is not to be extended.

1. Acceptable materials for this Work are as follows:

- a. "MasterEmaco T1061," by BASF.
- b. "Concrete Top Supreme," by Euclid.
- c. "Duro-crete," by King.
- d. "Planitop 15," by MAPEI.
- e. "SikaTop 111 Plus," by Sika.
- f. "CT-40 Do All Mortar," by Tomes.
- g. Other types may be used only with Engineer's approval in writing prior to bidding.

2.3 MATERIAL ACCESSORIES

A. Extended Open Time Epoxy Bonding Agent: Three component, water based, epoxy modified portland cement bonding agent and corrosion inhibitor coating providing the recommended Manufacturer's open time in which to apply repair mortar.

1. Acceptable materials for this Work are:
 - a. "MasterEmaco P124," by BASF.
 - b. "Duralprep A.C.," by Euclid.
 - c. "Planibond 3C," by MAPEI.
 - d. "Armatec 110 EpoCem", by Sika.
 - e. "B-1 Rebar Coating," by Tames.
- B. Bonding Grout: Bonding grout shall consist of prepackage repair material mixed with sufficient water to form stiff slurry to achieve consistency of "pancake batter."
- C. Clear, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- D. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- E. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Bonding Grout:
 1. Mix bonding grout and scrub into SSD repair substrate with a stiff broom to all areas as indicated on Drawings.
 2. Place repair material prior to initial set of grout. If grout sets prior to placement of repair material, completely remove grout from surface and re-clean prior to proceeding with new grout placement and repair mortar.
- B. Mortar Placement: Mortar materials shall be placed in strict accordance with manufacturer's instructions. Properly proportioned and mixed mortar material shall be placed using tools to consolidate mortar so that no voids exist within new material and continuous contact with base concrete is achieved.
- C. Form and Pour Repair Mortar Placement: Mix and apply in strict accordance with manufacturer's written instructions, to achieve a maximum 9" slump. Consolidate mortar so that no voids exist and continuous contact with base concrete is achieved.
- D. Vertical and Overhead Repairs: Mortar materials shall be placed in strict accordance with manufacturer's instructions. Properly proportioned and mixed mortar material shall be placed using tools to consolidate mortar so that no voids exist within new material and continuous contact with base concrete is achieved. Supplemental wire mesh shall be required for delamination and spall repairs greater than two inches in depth. Fresh bonding grout is required between successive lifts of patching material.
- E. Finishing:

1. Apply a nonslip broom finish to top of floor patches and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Provide a surface finish similar to adjacent surfaces for vertical and overhead partial depth repairs.
3. Finish formed surfaces similar to adjacent surfaces.

3.2 CONCRETE PROTECTION AND CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305R for hot-weather protection during placement. Keep concrete continually moist prior to final curing by evaporation retarder, misting, sprinkling, or using absorptive mat or fabric covering kept continually moist.
- B. Immediate upon conclusion of finishing operation cure concrete in accordance with ACI 308.1 for duration of at least three days by curing methods listed below. Provide additional curing immediately following initial curing and before concrete has dried.
 1. During initial and final curing periods maintain concrete above 50°.
 2. Prevent rapid drying at end of curing period.
- C. Concrete surfaces to receive slab coatings or penetrating sealers shall be cured with moisture curing or moisture-retaining-cover curing.
- D. Curing Methods: Cure formed and non-formed concrete moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 3. Curing compound: Apply curing compound in accordance with manufacturer's instructions.

3.3 FIELD QUALITY CONTROL

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

3.4 EVALUATION AND ACCEPTANCE OF WORK

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

END OF SECTION 03 37 60

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SECTION 03 63 00 - EPOXY INJECTION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the provision of all labor, materials, equipment, supervision and incidentals necessary to prepare cracks in structural concrete members and inject them with a 2-component, moisture-insensitive, 100 percent solids, low-viscosity epoxy resin system.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Submittal Procedures."
 - 2. Division 02 Section "Work Items."
 - 3. Division 02 Section "General Concrete Surface Preparation."
 - 4. Division 02 Section "Surface Preparation for Patching and Overlay."

1.3 QUALITY ASSURANCE

- A. Testing Agency will be independent testing laboratory employed by Owner and approved by Engineer/Architect.
- B. Testing Agency is responsible for conducting, monitoring and reporting to Owner results of all field tests of epoxy injection and installation required under this Section with copy of all reports to Engineer and Contractor.
- C. Submit following information for Field Testing of Epoxy Injection Installation unless modified in writing by Engineer/Architect:
 - 1. Project name and location.
 - 2. Contractor's name.
 - 3. Testing Agency's name, address and phone number.
 - 4. Epoxy material supplier.
 - 5. Date of report.
 - 6. Testing Agency technician's name (sampling and testing).
 - 7. Placement location within structure.
 - 8. Epoxy material data:
 - a. Epoxy type.

- b. Gel type.
 - c. Width of cracks injected (if applicable).
 - d. Crack conditions (dry or wet).
 - e. Injection port spacing.
 - f. Initial and (if different) constant injection pressures.
 - g. Use rate of epoxy.
9. Weather data:
- a. Air temperatures.
 - b. Weather.
 - c. Wind speed.
10. Field test data:
- a. Date, time and place of test.
 - b. Thickness of epoxy in crack or void.

D. Qualifications:

1. Contractor Qualifications: Contractor shall be qualified in the field of concrete repair and protection with a minimum of 5 years experience in application of similar systems and products on projects of similar size and scope.
 - a. Successful completion of a minimum of 3 projects of similar size and complexity to specified Work.
 - b. Contractor shall maintain qualified personnel who have received product training by a manufacturer's representative.
 - c. Install materials in accordance with all safety and weather conditions required by the manufacturer, or as modified by applicable rules and regulations of local, state, and federal authorities having jurisdiction.

Manufacturer Qualifications: The manufacturer of the specified product shall be ISO 9001:2000 Certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis. The manufacturer shall have a minimum 15 years of experience in manufacturing of surface hardener.

- E. Pre-Construction Meetings: Conduct Pre-Construction meeting at Project site to comply with requirements of Division 01 and as specified in this Section.
1. Schedule and convene meeting a minimum of 1 week prior to commencing Work of this Section.
 2. Review requirements for application, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details, installation procedures, testing and inspection procedures, protection, and repair.
 3. Discuss procedures for protecting adjacent finished Work.

1.4 REFERENCES

- A. "Standard Specifications for Structural Concrete," (ACI 301) by American Concrete Institute, herein referred to as ACI 301, is included in total as specification for this structure except as otherwise specified herein.
- B. Comply with provisions of following codes, specifications and standards except where more stringent requirements are shown on Drawings or specified herein:
 - 1. "Building Code Requirements for Reinforced Concrete," (ACI 318), American Concrete Institute, herein referred to as ACI 318.
 - 2. "Causes, Evaluation, and Repair of Cracks in Concrete Structures" (ACI 224.112), American Concrete Institute.
 - 3. "State-of-the-Art Report on Parking Structures" (ACI 362), American Concrete Institute.
 - 4. "Specification for Crack Repair by Epoxy Injection" (ACI 503.7), American Concrete Institute.
 - 5. "Guide for the Application of Epoxy and Latex Adhesives for Bonding Freshly Mixed and Hardened Concretes", (ACI 503.6), American Concrete Institute.
 - 6. "Standard Specification for Bonding Hardened Concrete, Steel, Wood, Brick, and Other Materials to Hardened Concrete with a Multi-Component Epoxy Adhesive" (ACI 503.1), American Concrete Institute.
 - 7. "Guide for Repair of Concrete Bridge Superstructures" Reported by ACI Committee 546 (ACI 546.1).
- C. Contractor shall have following ACI/ICRI publications at Project construction site at all times:
 - 1. "Specification for Crack Repair by Epoxy Injection" (ACI 503.7), American Concrete Institute." Structural Crack Repair by Epoxy Injection", ACI RAP Bulletin 1, American Concrete Institute.
 - 2. "Standard Specification for Bonding Hardened Concrete, Steel, Wood, Brick, and Other Materials to Hardened Concrete with a Multi-Component Epoxy Adhesive" (ACI 503.1), American Concrete Institute.

1.5 SUBMITTALS

- A. Make submittals in accordance with requirements of Division 01 and as specified in this Section.
- B. Contractor: Submit manufacturer's product data sheets, technical sheets, recommended application procedures and information on epoxy injection equipment.
- C. Testing Agency: Promptly report all test results to Engineer/Architect and Contractor. Include following information:
 - 1. See Article "Quality Assurance," paragraph "Submit following information for Field Testing...."

2. Visual examination of epoxy resin penetration.
- D. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
- E. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

1.6 WARRANTY

- A. System manufacturer and Contractor shall furnish Owner written single source performance guarantee that epoxy resin injection system will be free of defects related to design, workmanship or material deficiency for 3-year period from date of acceptance of Work required under this Section against leakage or bond failure:
 1. Any adhesive or cohesive failure.
 2. Cracking or other weathering deficiency.
 3. Normal abrasion or tear failure.
- B. Any repair under this guarantee shall be done at no cost to Owner. Guarantee shall be provided by Contractor and manufacturer of system.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Injection epoxy shall be one of following:
 1. "MasterInject 1380" or "MasterInject 1500" as manufactured by Master Builders Solutions, Shakopee, MN.
 2. "Sikadur 35 Hi-Mod LV" or "Sikadur 52" as manufactured by Sika Chemical Corporation, Lyndhurst, NJ.
 3. "Epoxy HP-LV" as manufactured by Hunt Process Corp-Southern, Ridgeland, MS.
 4. "Pro-Poxy 50 Super LV" as manufactured by Unitex, Kansas City, MO.
 5. "Eucopoxy" or "Duralcrete LV" as manufactured by The Euclid Chemical Company, Cleveland OH.
 6. "Sure Inject J56 SLV" as manufactured by Dayton Superior Corp., Miamisburg OH.
 7. "KonTek 11 LV" as manufactured by Contech Group, Inc. Seattle, WA.
 8. "Kemko 038" as manufactured by ChemCo Systems, Inc., Redwood City, CA.
- B. Epoxy gel shall be as specified by the selected injection epoxy manufacturer.
- C. Equipment:

1. Epoxy injection unit shall be portable and equipped with positive displacement-type pumps with interlock to provide positive ration control of epoxy injection resin components. Pumps shall be air or electric powered and shall provide in-line mixing and metering system and shall be equipped with drain-back plugs.
2. Equipment used to inject epoxy shall be capable of following:
 - a. Automatic proportioning of materials within mix ratio tolerances set by epoxy resin manufacturer.
 - b. Delivery of components, resin and hardeners, from separate reservoirs to mixing type discharge head.
 - c. Complete and uniform mixing of components at discharge head.
 - d. Injection of resin system at constant pressures not to exceed 150 psi.

PART 3 - EXECUTION

3.1 PREPARATION

A. Crack Identification:

1. All cracks 0.03 in. wide or greater that are designated by Engineer/Architect, and not coincident with principal delamination, shall be injected. Cracks that occur coincident with principal delaminations shall not be injected.
2. Cracks requiring repair shall be located by Contractor at time of construction and marked with chalk.

B. Crack Preparation for Injection:

1. Surface of concrete adjacent to crack must be free of all laitance, efflorescence, dirt or foreign particles.
2. Cracks may be damp or dry as per injection material manufacturer's recommended installation procedures.
3. All cracks shall be properly sealed along their exposed length with an approved epoxy gel.
4. Epoxy injection ports shall be uniformly spaced along crack and shall be installed as recommended by system manufacturer. If concrete member being injected is exposed on both sides, provide injection ports on opposite sides at staggered intervals.
5. Apply epoxy gel around injection port to provide an adequate seal to prevent escape of injection resin from perimeter of port while under pressure.
6. Apply epoxy gel for sealing in manner that will result in minimal defacing or disorganization of concrete substrate.

3.2 INSTALLATION

A. Epoxy Injection:

1. Dispense epoxy injection resin under constant pressure in accordance with manufacturer's recommended procedures or as required to achieve maximum filling and penetration of crack without inclusion of air voids in epoxy resin material.
2. Injection shall begin at lowest port and progress incrementally higher.
3. Appearance of epoxy resin at next higher port shall be considered evidence of successful crack filling.
4. If penetration of epoxy resin into cracks is not possible, notify Engineer/Architect prior to discontinuing injection procedures. If alternate injection procedures are possible, submit procedure in writing to Engineer/Architect for review.
5. Contractor shall adhere to all limitations and cautions for epoxy resin injection material as per manufacturer's current printed literature.

B. Cleaning:

1. When cracks are completely filled, allow adhesive to cure for sufficient time to allow the removal of the surface seal without any draining or runback of epoxy material from the cracks.
2. Remove the surface seal material, ports, and injection adhesive runs or spills from concrete surfaces.
3. Finish the face of the crack flush to the adjacent concrete, removing any indentations or protrusions caused by the placement of entry ports.
4. Match work area to adjacent surface including any surface treatments.

3.3 FIELD QUALITY CONTROL BY TESTING AGENCY

A. Core Testing:

1. Testing Agency shall obtain 3- 2 in. minimum diameter core samples in first 100 ft of repaired cracks and 1 core for each 100 ft thereafter. Cores shall be taken after injection resin has cured for period of 7 days. Core sample shall be for full crack depth. Core locations and sizes shall be submitted to Engineer/Architect for review prior to taking core samples. Care should be taken not to damage or cut existing reinforcement (ESPECIALLY POST-TENSIONING TENDONS).
2. Core samples shall be visually examined to determine degree of epoxy penetration. Minimum of 90% of crack shall be full of epoxy adhesive.

B. Evaluation and Acceptance of Epoxy Injection:

1. Results of visual examination will be reviewed by Engineer/Architect for compliance with Article "Field Quality Control by Testing Agency," paragraph "Core Testing."
2. If results of initial cores fail by lack of penetration, work shall not proceed further until area represented by cores has been re-injected and re-tested for acceptance.
3. After cracks have been re-injected, additional cores shall be taken as directed by Engineer/Architect. Cores shall be tested for compliance with Article "Field

Quality Control by Testing Agency," paragraph "Core Testing" by Owner's Testing Agency at Contractor's expense.

4. Core holes shall be filled with non-shrink grout material. Grout shall be applied with hard trowel, and be thoroughly rodded and tamped in place. Finish, texture and color to match existing surface. Materials and procedures for filling testing core holes shall be submitted to Engineer/Architect for review prior to starting work.

C. Acceptance of Structure:

1. Acceptance of completed concrete injection work will be according to requirements of Article "Field Quality Control by Testing Agency," paragraph "Core Testing."
2. Grouted core holes shall be sounded by Engineer/Architect and Contractor with hammer or rod after curing for 48 hours.

END OF SECTION 03 63 00

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SECTION 036400 –INJECTION GROUTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary ss

1.2 SUMMARY

- A. This Section includes the provision of all labor, materials, equipment, supervision and incidentals necessary to prepare cracks in structural concrete members and inject them with a chemical grout resin system.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Submittal Procedures."
 - 2. Division 02 Section "Work Items."
 - 3. Division 02 Section "Selective Structure Demolition."
 - 4. Division 02 Section "Structure Demolition."
 - 5. Division 02 Section "General Concrete Surface Preparation."
 - 6. Division 02 Section "Surface Preparation for Patching and Overlay."
 - 7. Division 03 Section "Epoxy Injection Systems."

1.3 QUALITY ASSURANCE

- A. Testing Agency will be independent testing laboratory employed by Owner and approved by Engineer.
- B. Testing Agency is responsible for conducting, monitoring and reporting to Owner results of all field tests of chemical grout resin injection and installation required under this Section with copy of all reports to Engineer and Contractor.
- C. Submit following information for Field Testing of Chemical Grout Injection Installation unless modified in writing by Engineer:
 - 1. Project name and location.
 - 2. Contractor's name.
 - 3. Testing Agency's name, address and phone number.
 - 4. Chemical grout manufacturer.
 - 5. Date of report.
 - 6. Testing Agency technician's name (sampling and testing).
 - 7. Placement location within structure.
 - 8. Chemical grout material data:

- a. Resin type.
 - b. Port type.
 - c. Width of cracks injected (if applicable).
 - d. Crack conditions (dry or wet).
 - e. Injection port spacing.
 - f. Initial and (if different) constant injection pressures.
 - g. Use rate of chemical grout.
 - h. Crack and port sealing patching material and application methods.
9. Weather data:
- a. Air temperatures.
 - b. Weather.
 - c. Wind speed.
10. Field test data:
- a. Date, time and place of test.
 - b. Thickness of resin in crack or void.

1.4 REFERENCES

- A. "Standard Specifications for Structural Concrete," (ACI 301) by American Concrete Institute, herein referred to as ACI 301, is included in total as specification for this structure except as otherwise specified herein.
- B. Comply with provisions of following codes, specifications and standards except where more stringent requirements are shown on Drawings or specified herein:
 1. "Building Code Requirements for Reinforced Concrete," (ACI 318), American Concrete Institute, herein referred to as ACI 318.

1.5 SUBMITTALS

- A. Make submittals in accordance with requirements of Division 01 and as specified in this Section.
- B. Contractor: Submit manufacturer's product data sheets, technical sheets, recommended application procedures and information on chemical grout injection equipment.
- C. Testing Agency: Promptly report all test results to Engineer and Contractor. Include following information:
 1. See Article "Quality Assurance," paragraph "Submit following information for Field Testing...."
 2. Visual examination of grout resin penetration.

- D. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
- E. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints

1.6 WARRANTY

- A. System manufacturer and Contractor shall furnish Owner written single source performance guarantee that chemical grout injection system will be free of defects related to design, workmanship or material deficiency for 3-year period from date of acceptance of Work required under this Section against leakage or bond failure of patching materials.
- B. Any repair under this guarantee shall be done at no cost to Owner. Guarantee shall be provided by Contractor and manufacturer of system.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Hydrophobic Chemical grout injection system shall be one of following:
 - 1. "Mountain Grout SLV or HL-100" as manufactured by Green Mountain International, LLC, 235 Pigeon Street, Waynesville, NC 28786.
 - 2. "Hydro Active Cut" as manufactured by De Neef Construction Chemicals (U.S.) Inc., 5610 Brystone Dr., Houston, TX 77041.
 - 3. "Urethane R" as manufactured by PYCOSA Chemicals, Inc., 1851 Gulf Freeway South, Suite 8, League City, TX 77573.
 - 4. "Dural Aqua-Dam LV" as manufactured by The Euclid Chemical Company, 19218 Redwood Rd., Cleveland, OH 44110.
 - 5. "Prime Flex EXP" as manufactured by Prime Resins, 2291 Plunkett Road, Conyers, GA 30012.
 - 6. "ST-540 Injection Resin" as manufactured by Strata-Tech, Inc., 3601 104th Street, Des Moines, IA 50322.
- B. Equipment:
 - 1. Equipment used to inject grout shall be capable of following:
 - a. High pressure range of 2000 to 2500 psi by positive displacement.
 - b. Injection of grout system at constant pressures as required by the manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Crack Identification:

1. All cracks 1/32 in. wide or greater that are designated by Engineer, and not coincident with principal delamination, shall be injected. Cracks that occur coincident with principal delaminations shall not be injected, unless authorized by Engineer.
2. All cracks shall be located by Contractor at time of construction and marked with chalk. Cracks to be injected are to be verified and approved by the Engineer prior to crack preparation.

B. Crack Preparation for Injection:

1. Surface of concrete adjacent to crack must be free of all laitance, efflorescence, dirt or foreign particles.
2. Cracks are to be prepared according to Drawings and Work Item Details per manufacturer's recommendations.
3. Drill hole at 45 degree angle, beginning at a distance away from the crack so that the drilled hole intercepts the crack at approximately one half the thickness of the concrete. If repairing a vertical concrete face, drill the first hole at the bottom of the crack and work upwards.
4. Stagger holes either side of crack with a 12-inch maximum spacing.
5. Insert grout port into the drilled hole and tighten according to manufactures recommendations.

3.2 INSTALLATION

A. Chemical Grout Injection:

1. Flush crack with clean water immediately prior to the injection of the chemical grout, where this will indicate how the crack will behave during the grout injection and will prime the crack for the chemical reaction to occur.
2. Begin the injection on the lowest port on a vertical crack. Inject material until it appears at the next adjacent port. Disconnect and start injection on the next port. Continue to inject up the crack moving from port to port. After injection of a few ports, come back to the first port and reinject all the ports for a second time. Continue the procedure until the crack is completely filled and no water is leaking from crack. Re-inject each port with a small amount of water to ensure a full reaction of all of the resin in the drill holes.
3. After determining the crack is not leaking, clean the crack surface flush; remove the ports after the resin is set and patch injection holes according to repair Details.
4. Port holes shall be filled with non-shrink grout material. Grout shall be applied with hard trowel, and be thoroughly rodded and tamped in place. Finish, texture and color to match existing surface.
5. Contractor shall adhere to all limitations and cautions for chemical grout injection material per manufacturer's current printed literature.
6. For injecting ceiling cracks, follow manufacture installation guidelines and recommendations.

7. Contractor shall adhere to all Federal, State and Local regulations for the use and disposal of all products.

B. Cleaning:

1. Contractor shall leave work area in clean condition when injection work is completed. Any chemical grout resin materials shall be cleaned off adjacent areas. Any painted surfaces are to be returned to original condition.

3.3 FIELD QUALITY CONTROL BY TESTING AGENCY

A. Evaluation and Acceptance of Chemical Grout Injection:

1. Results by visual examination will be reviewed by Engineer for lack of leaking water.
2. If the leakage continues in part of the crack, it shall be re-injected with no additional quantity as a pay item.

END OF SECTION 03 64 00

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SECTION 04 22 00 - CONCRETE UNIT MASONRY

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. Concrete masonry units.
 - 2. Mortar and grout.
 - 3. Steel reinforcing bars.
 - 4. Masonry-joint reinforcement.
 - 5. Miscellaneous masonry accessories.
 - 6. Masonry-cell fill.
- B. Products Installed but not Furnished under This Section:
 - 1. Cast-stone trim in concrete unit masonry.
- C. Related Requirements:
 - 1. Division 03 Section "Cast-in-Place Concrete Restoration" for dovetail slots for masonry anchors.
 - 2. Division 05 Section "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.

- C. Shop Drawings: For the following:
1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.
 3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Material Certificates: For each type and size of the following:
1. Masonry units.
 - a. Include data on material properties.
 2. Integral water repellent used in CMUs.
 3. Cementitious materials. Include name of manufacturer, brand name, and type.
 4. Mortar admixtures.
 5. Pre-blended, dry mortar mixes. Include description of type and proportions of ingredients.
 6. Grout mixes. Include description of type and proportions of ingredients.
 7. Reinforcing bars.
 8. Joint reinforcement.
 9. Anchors, ties, and metal accessories.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- D. Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

- B. Deliver pre-blended, dry mortar mix in moisture-resistant containers. Store pre-blended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- C. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.
 - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.

2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet vertically and horizontally of a walking surface.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

- A. Regional Materials: CMUs shall be manufactured within 100 miles of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. Provide square-edged units for outside corners unless otherwise indicated.
- C. CMUs: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi.
 - 2. Density Classification: Normal weight unless otherwise indicated.
 - 3. Size (Width): Manufactured to dimensions 3/8 inch less-than-nominal dimensions.
 - 4. Exposed Faces: Provide color and texture matching the existing.

2.5 MORTAR AND GROUT MATERIALS

- A. Regional Materials: Aggregate for mortar and grout shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- B. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
 - 1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- E. Masonry Cement: ASTM C 91/C 91M.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Cemex S.A.B. de C.V.
 - b. Essroc.
 - c. Holcim (US) Inc.
 - d. Lafarge North America Inc.
 - e. Lehigh Hanson; HeidelbergCement Group.
- F. Mortar Cement: ASTM C 1329/C 1329M.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Lafarge North America Inc.
- G. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
- H. Water: Potable.

2.6 REINFORCEMENT

- A. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Dur-O-Wal; a Hohmann & Barnard company.
 - b. Heckmann Building Products, Inc.
 - c. Hohmann & Barnard, Inc.
 - d. Wire-Bond.
- B. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A 951/A 951M.
1. Interior Walls: Mill galvanized carbon steel.
 2. Exterior Walls: Hot-dip galvanized carbon steel.
 3. Wire Size for Side Rods: 0.148-inch diameter.
 4. Wire Size for Cross Rods: 0.148-inch diameter.
 5. Spacing of Cross Rods: Not more than 16 inches o.c.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.8 MASONRY-CELL FILL

- A. Loose-Fill Insulation: Perlite complying with ASTM C 549, Type II (surface treated for water repellency and limited moisture absorption) or Type IV (surface treated for water repellency and to limit dust generation).
- B. Lightweight-Aggregate Fill: ASTM C 331/C 331M.

2.9 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use portland cement-lime mortar unless otherwise indicated.
 - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

- B. Mortar for Unit Masonry: Comply with ASTM C 270, Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 - 1. For reinforced masonry, use Type S.
 - 2. For mortar parge coats, use Type S.
 - 3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
 - 4. For interior non-load-bearing partitions, Type O may be used instead of Type N.

- C. Grout for Unit Masonry: Comply with ASTM C 476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 - 2. Proportion grout in accordance with ASTM C 476.
 - 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.
 - 4. Application: Use epoxy pointing mortar for exposed mortar joints with pre-faced CMUs.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
 - 4. Verify that substrates are free of substances that would impair mortar bond.

- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
 - 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
 - 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2-inch total.
- B. Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet or 1/2-inch maximum.
 - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
 - 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
 - 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
 - 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
 - 6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
 - 7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch.
- C. Joints:
 - 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
 - 2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.

3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.4 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
 3. Bed webs in mortar in grouted masonry, including starting course on footings.
 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
- B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
 2. Wet joint surfaces thoroughly before applying mortar.
 3. Rake out mortar joints for pointing with sealant.
- D. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.
- E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- G. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

3.5 MASONRY-CELL FILL

- A. Pour loose-fill insulation into cavities to fill void spaces. Maintain inspection ports to show presence of fill at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of fill to one story high, but not more than 20 feet.
- B. Install molded-polystyrene insulation units into masonry unit cells before laying units.

3.6 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- F. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- H. Prism Test: For each type of construction provided, according to ASTM C 1314 at 28 days.

3.8 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.9 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
 - 1. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 22 00

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SECTION 07 18 00 – TRAFFIC COATINGS



PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. A single installer shall be responsible for providing complete waterproofing system including all products specified in following Sections:
 - 1. Division 07 Section, "Traffic Coatings"
- B. This Section includes traffic coating: Fluid applied, waterproofing, traffic-bearing elastomeric membrane with integral wearing surface, where surface to which membrane is to be applied on the top of the beams.
- C. Materials shall be compatible with other materials or related Work with which the traffic coating will come into contact, and with materials covered by this Section.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Distribute reviewed submittals to all others whose Work is related.
- B. Pre-installation Conference: Meet at project site well in advance of time scheduled for Work to proceed to review requirements for Work and conditions that could interfere with successful coating performance. Require every party concerned with coating Work, or required to coordinate with it or protect it thereafter, to attend. Include manufacturer's technical representative and warranty officer.
- C. Make submittals in accordance with requirements of Division 01 Section, "Submittal Procedures:"
 - 1. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
 - 2. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.
- D. Submittals and Resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal data initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections

made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including cost of Engineer's services made necessary to review such additional resubmittals. Owner shall in turn reimburse Engineer.

E. Requests For Information

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

1.4 ACTION SUBMITTALS

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

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

B. Samples:

1. One stepped sample showing each component for each system indicated.

1.5 INFORMATION SUBMITTALS

A. Certificates

1. Certification that products and installation comply with applicable federal, state where project is located, and local EPA, OSHA and VOC requirements regarding health and safety hazards where project is located. VOC shall also comply with South Coast Air Quality Management in southern California (SCAQMD) Rule 1113.
2. Evidence of applicator's being certified by manufacturer. Evidence shall include complete copy of manufacturer's licensing/certification document, spelling out repair responsibility for warranty claims.
3. Certification from Manufacturer that finishes as specified are acceptable for system to be installed at least 1 month before placement of any concrete which will receive traffic coating.
4. Certification stating materials have been tested and listed for UL 790 Class "A" rated materials/system by UL for traffic coating application specified on project. Containers shall bear UL labels.
5. Certification from manufacturer confirming compatibility with existing underlying coatings and/or substrate.

- B. Manufacturer's Instructions: for each system indicated.
 - 1. Crack treatment and surface preparation method and acceptance criteria.
 - 2. Method of application of each coat.
 - 3. Maximum and minimum application temperatures.
 - 4. Maximum and minimum allowable times between coats.
 - 5. Final cure time before resumption of foot traffic, parking and/or paint striping.
 - 6. Any other special instructions required to ensure proper installation.

- C. Field Quality Control:
 - 1. Quality Control Plan as defined in Part 3.
 - 2. Copy of manufacturer's technical representative's log for each visit.
 - 3. Testing agency field reports.

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

- E. Sample Warranty: For each system indicated.
 - 1. Submit manufacturers sample warranty which meets the requirements of the specified warranty terms and conditions.

1.6 CLOSEOUT SUBMITTALS

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

1.7 QUALITY ASSURANCE

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

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

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all materials to site in original, unopened containers, bearing following information:
 - 1. Name of product.
 - 2. Name of manufacturer.
 - 3. Date of preparation.
 - 4. Lot or batch number.
- B. Store materials under cover and protect from weather. Replace packages or materials showing any signs of damage with new material at no additional cost to Owner.
- C. Do not store material on slabs to be post-tensioned before final post-tensioning of slabs is accomplished. At no time shall weight of stored material being placed on slab area, after post-tensioning is completed and concrete has reached specified 28 day strength, exceed total design load of slab area. Between time final post-tensioning is accomplished and time concrete has reached specified 28 day strength, weight of stored material placed on slab area shall not exceed half total design load of slab area.

- D. Distribute materials stored on elevated structures to prevent exceeding structure load limits.

1.9 FIELD CONDITIONS

- A. Weather and Substrate Conditions: Proceed with work only when existing and forecast weather, temperature of concrete substrate, and ambient conditions within the structure will permit work in accordance with manufacturer's recommendations. Do not apply traffic coatings to damp or wet substrates, when temperatures are below 40 deg F (5 deg C), when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F (3 deg C) above dew point.
- B. Do not apply traffic coatings 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.
- C. Do not install traffic coating until items that penetrate membrane have been installed.

1.10 WARRANTY

- A. System Manufacturer (New Application): Furnish Owner with written 5-year, total responsibility Joint and Several Warranty, detailing responsibilities of manufacturer and applicator with regard to warranty requirements (Joint and Several) commencing with date of acceptance of work. Warranty shall provide that system will be free of defects, water penetration and chemical damage related to system design, workmanship, or material deficiency, consisting of:
 - 1. Any adhesive or cohesive failures.
 - 2. Abrasion or tearing failures from normal traffic use.
 - 3. Excessive aggregate loss (Coefficient of Friction below 0.6).
 - 4. Weathering. Breakdown/degradation of topcoat.
 - 5. Excessive Wear: Base coat showing through top coat.
 - 6. Surface cracking or intercoat delamination.
 - 7. Abrasion or tear failure of membrane resulting from normal traffic use.
 - 8. Failure to bridge cracks less than 0.0625 in. or cracks existing at time of traffic coating installation.
- B. System Manufacturer (Partial System Recoating): Furnish Owner with written 5-year, total responsibility Joint and Several Warranty, detailing responsibilities of manufacturer and applicator with regard to warranty requirements (Joint and Several). Warranty shall provide that system will be free of defects, chemical damage related to system design, workmanship, or material deficiency, consisting of:
 - 1. Any adhesive or cohesive failures.
 - 2. Abrasion or tearing failures from normal traffic use.
 - 3. Excessive aggregate loss (Coefficient of Friction below 0.6).
 - 4. Weathering. Breakdown/degradation of topcoat.
 - 5. Excessive Wear: Base coat showing through top coat.

6. Surface cracking or intercoat delamination.
 7. Abrasion or tear failure of membrane resulting from normal traffic use.
 8. Failure to bridge cracks less than 0.0624 in. or cracks existing at time of traffic coating installation.
- C. If material surface shows any of defects listed above, supply labor and material to repair all defective areas and to repaint all damaged line stripes.
- D. Perform any repair under this warranty at no cost to Owner.
- E. Address following in terms of Warranty: length of warranty, change in value of warranty – if any – based on length of remaining warranty period, transferability of warranty, responsibilities of each party, notification procedures, dispute resolution procedures, and limitations of liability for direct and consequential damages.
- F. Snowplows, vandalism, studded snow tires, and abnormally abrasive maintenance equipment are not normal traffic use and are exempted from warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of 1 of following, only where specifically named in product category:
1. Advanced Polymer Technology (APT), Harmony, PA.
 2. GCP Applied Technologies (GCP), Alpharetta, GA.
 3. Lymtal International Inc. (Lymtal), Lake Orion, MI.
 4. Master Builders Solutions Construction Systems US (Master Builders), Shakopee, MN.
 5. Neogard Division of Hemple (Neogard), Dallas, TX.
 6. Pacific Polymers, Inc. a Division of ITW (Pacific Polymers), Garden Grove, CA.
 7. Pecora Corporation (Pecora), Harleysville, PA.
 8. Polycoat Products Division of Amer. Polymers (Polycoat), Santa Fe Springs, CA.
 9. R&D Technical Solutions, Ltd. (R&D), Mississauga, ON, Canada.
 10. Sika Corporation (Sika), Lyndhurst, NJ.
 11. Tremco (Tremco), Cleveland, OH.

2.2 MATERIALS, TRAFFIC COATING

- A. Acceptable low odor coatings are listed below. Coatings shall be compatible with all other materials in this Section and related work.
1. Medium Duty:
 - a. Auto-Gard, Neogard.
 - b. Elasto-Deck 5000-HT, Pacific Polymers.

- c. Iso-Flex 750U-HL MVT/760U-HL MVT, LymTal.
 - d. MasterSeal Traffic 1500, Master Builders.
 - e. Qualideck Medium Vehicular (152/252/372/582), APT.
 - f. Sikalastic 710/715, Sikalastic 720/745, Sika.
 - g. Vulkem 350NF/950NF/951NF, Tremco.
 - h. Kelmar Merdek (Exposure 2 - Medium Duty - one layer wear course), R&D
 - i. Pecora-Deck 8123, Pecora.
 - j. Poly-I-Gard 246MD, Polycoat.
2. Heavy Duty:
- a. Auto-Gard, Neogard.
 - b. Elasto-Deck 5000-HT, Pacific Polymers.
 - c. Iso-Flex 750U-HL HVT/760U-HL HVT Deck Coating System, LymTal.
 - d. MasterSeal Traffic 1500, Master Builders.
 - e. Qualideck Heavy Vehicular (152/252/372/582), APT
 - f. Sikalastic 710/715, Sikalastic 720/745, Sika.
 - g. Vulkem 350NF/951NF/951NF Deck Coating System, Tremco.
 - h. Kelmar Merdek (Exposure 3 - Heavy Duty - two layer wear course), R&D.
 - i. Pecora-Deck 8123 HD, Pecora.
 - j. Poly-I-Gard 246HD, Polycoat.
3. VOC Compliant, Low Odor, High-Solids, Fast Cure, Heavy Duty Coating System:
- a. Auto-Gard FC, Neogard.
 - b. Iso-Flex 760 U HL AR and 760 U HL AL, LymTal.
 - c. MasterSeal Traffic 2500, Master Builders.
 - d. Qualideck Heavy Vehicular (152/252/372/582), APT.
 - e. Sikalastic 720/745 or 390/391/395, Sika.
 - f. Vulkem 360NF/950NF and 951NF, Tremco.
 - g. Kelmar Merdek (Exposure 3 - Heavy Duty - two layer wear course), Kelmar FWC III(Exposure 3), R&D.
4. Hybrid VOC Compliant, Low Odor, High-Solids, Heavy Duty Coating System:
- a. Auto-Gard E, Neogard.
 - b. Iso-Flex 750EU HVT, Lymtal.
 - c. MasterSeal Traffic 2530, Master Builders.
 - d. Sikalastic 22 Lo-Mod Hybrid (720/22 LM/745 AL), Sika.
 - e. Kelmar Merdek (Exposure 3 - Heavy Duty - two layer wear course), Kelmar FWC III (Exposure 3), R&D.
5. PMMA/PUMA Technologies Coatings:
- a. RTS Vehicular, Neogard.
 - b. MasterSeal Vehicular Traffic 2900, Master Builders.
 - c. Sikalastic Pronto RB-5700, Sika.
 - d. Vulkem EWS, Tremco.
 - e. SAFETRACK DS, GCP

- B. Recoating Complete System: Provide complete traffic coating system with all components specified for new, heavy-duty applications, including all waterproofing and wearing courses.
 - 1. System shall provide 200 psi minimum bond strength to existing system.
- C. Provide ultraviolet screening for all traffic coating placed on this project.
- D. Finish top coat shall be colored as per Owner's choice.
- E. Substitutions: None for this project. Contact Engineer for consideration for future projects.

2.3 MATERIALS, CRACK SEALER

- A. Repair for isolated random non-moving (static) horizontal cracks 0.01 in. to 0.03 in. wide. Acceptable products:
 - 1. SikaPronto 19 4K, Sika.
 - 2. Sikadur 55 SLV Epoxy Crack Healer/Sealer, Sika.
 - 3. MasterSeal 630/Sikalastic-630, MBS/Sika.
 - 4. DeNeef Denepox I-40, GCP.
 - 5. Iso-Flex 609 Epoxy Crack Sealer, Lymtal.
- B. Repair of isolated moving (dynamic) horizontal cracks shall be in accordance with Division 07, Section "Concrete Joint Sealants."

2.4 ACCESSORY MATERIALS

- A. Joint Sealants: As specified in Section 07 92 00 "Concrete Joint Sealants."
- B. Reinforcing Strip: Polymer mesh (polyester or polyethylene) recommended in writing by traffic-coating manufacturer, as required by manufacturer

2.5 SOURCE LIMITATIONS

- A. Obtain primary traffic-coating materials, including primers, from single source from single traffic-coating manufacturer. Obtain accessory materials including aggregates, sheet flashings, joint sealants, and substrate repair materials of types and from sources recommended in writing by primary material manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Seal all openings to occupied space to prevent cleaning materials, solvents and fumes from infiltration. All protective measures and/or ventilating systems required to prevent infiltration are incidental to this Work.
- B. Concrete substrates: mechanically abrade surface to a uniform profile acceptable to manufacturer, in general conformance with ASTM D4259. Acid etching is prohibited.
- C. Remove all laitance and surface contaminants, including oil, grease and dirt as specified by manufacturer's written recommendations.
- D. Remove all debonded traffic coatings as determined by site inspection. Remove all laitance and surface contaminants, including oil, grease and dirt, by shot blasting and appropriate degreasers, or as specified by manufacturer's written recommendations to provide warranty.
- E. Before applying materials, apply system to small area to assure that it will adhere to substrate and joint sealants and dry properly and to evaluate appearance.
- F. All cracks on concrete surface shall be prepared in accordance with manufacturer's recommendations.
 - 1. All random cracks on concrete surface less than 0.03 in. wide and showing no evidence of water and/or salt water staining on ceiling below shall receive detail coat unless more complete treatment required in accordance with manufacturer's recommendations.
 - a. Rout and seal random cracks, construction joints and control joints prior to installation of primer or base coat. Crack preparation including installation of joint sealant material, where required, is incidental to traffic coating work.
- G. Mask off adjoining surfaces not to receive traffic coating and mask off drains to prevent spillage and migration of liquid materials outside membrane area. Provide neat/straight lines at termination of traffic coating.

3.3 INSTALLATION/APPLICATION

- A. Installation should include all of the following steps or in accordance with manufacturer's written instructions and specifications:
1. Surface Preparation: Prepare concrete for system application.
 2. Crack/Construction/Control/Cove Joint Sealing: Detail for crack bridging.
 - a. If reinforcing mesh is utilized at joints, ensure mesh is installed and fully embedded in base coat without bunching, wrinkles, fish mouths or protrusions above the surface of the base coat in which it is embedded.
 3. Primer Coat: Insure proper adhesion of membrane to substrate.
 4. Base Coat: Provide crack spanning in conjunction with Crack Detail noted above and provide monolithic coating without pinholes, blisters, or voids in coating,
 5. Wear Coat providing skid and wear resistance.
 - a. Aggregate: Correct size, shape, hardness and amount necessary to insure proper skid and wear resistance.
 - b. Provide monolithic coating without pinholes, blisters, or voids in coating
 6. Top Coat: Lock aggregate into place, provide a maintainable surface and provide resistance to ponding water, UV degradation, color loss and chemical intrusion.
 - a. Provide monolithic coating without pinholes, blisters, or voids in coating
 - b. Not required for approved hybrid wearing course with integral aggregate.
- B. A primer coat is required for all systems. No exception. Reprime areas exposed for more time than recommended by manufacturer.
- C. Schedule preparation work so dust and other contaminants from process do not fall on wet, newly coated surfaces.
- D. Perform all work and apply traffic coating according to ASTM C 1127 and in accordance with manufacturer's written instructions and specifications including, but not limited to, moisture content of substrate, atmospheric conditions (including relative humidity and temperature), coverages, mil thicknesses, crack and joint detailing, and texture, and as shown on Drawings. Verify that substrates are visibly dry and free of moisture.
- E. Do not apply traffic coating products until moisture content of substrates is acceptable for installation.
1. New construction projects: Do not apply traffic coating material until new concrete has been air dried at temperatures at or above 40°F for at least 30 days after curing period specified, or test substrates to determine that the actual moisture content meets traffic coating manufacturer's requirements.
 2. Existing construction restoration projects: Do not apply traffic coating material until repair concrete has adequately cured. Test substrates to determine the actual moisture content meets traffic coating manufacturer's requirements.

3. Test for moisture in new concrete slabs, at concrete repair areas, or areas suspect of moisture by one of the following methods:
 - a. ASTM F2170 (relative humidity)
 - b. Method recommended in writing by traffic-coating manufacturer, including but not limited to:
 - 1) ASTM D4263 (plastic mat test)
 - 2) Measuring with an electronic impedance moisture meter, per ASTM F2659
 - 3) ASTM F1869 (calcium chloride test; not acceptable for lightweight concrete)
- F. Do not apply traffic coating membranes products until concrete has attained compressive strength to resist primer tensile adhesion values as per manufacturer's written instructions and specifications.
- G. Cease material installation under adverse weather conditions, when temperatures of work area or substrate are below 40° F, or outside manufacturer's recommended limitations for installation.
- H. Prepare vertical and horizontal surfaces at terminations and penetrations through traffic coatings and at expansion joints, drains, and sleeves according to manufacturer's written instructions.
- I. Provide sealant cants at penetrations and at reinforced and nonreinforced, deck-to-wall butt joints.
- J. Terminate edges of deck-to-deck expansion joints with preparatory base-coat strip.
- K. All adjacent vertical surfaces shall be coated with traffic coating 4 in. above coated horizontal surface. Requirement includes, but is not limited to pipes, columns, walls, curbs (full height of vertical faces of all curbs) and islands.
- L. Mask off adjoining surfaces not to receive traffic coating and mask off drains to prevent spillage and migration of liquid materials outside membrane area. Provide neat/straight lines at termination of traffic coating.
- M. Complete all Work under this Section before painting line stripes.
- N. Clean off excess material and material smears adjacent to joints as work progresses using methods and materials approved by manufacturers.

3.4 FIELD QUALITY CONTROL

- A. Develop a quality control plan for assured specified uniform membrane thickness that utilizes grid system of sufficiently small size to designate coverage area of not more than 5 gallons at specified thickness. In addition, employ wet mil gauge to continuously monitor thickness during application. Average specified wet mil thickness shall be

maintained within grid during application with minimum thickness of not less than 80% of average acceptable thickness. Immediately apply more material to any area not maintaining these standards.

1. Testing Agency: employ wet mil gauge to periodically monitor thickness during application.
- B. Mock-Up: Install 1 trial section of coating system for each duty grade specified. Do not proceed with further coating application until trial sections accepted in writing by Engineer. Remove and replace rejected trial sections with acceptable application. Size: 200 sq. ft. of each substrate to demonstrate surface preparation, joint and crack treatment, thickness, texture, color, and standard of workmanship. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. Trial section shall also be tested for:
1. Wet mil thickness application.
 2. Overall dry mil thickness.
 3. Adhesion to concrete substrate.
 - a. Perform three (3) adhesion pull -off tests in accordance with ASTM D7234, Standard Test Method for Pull-Off Strength of Coatings on Concrete Using Portable Adhesion Testers.
 - 1) The average of the tests shall be 200 psi or greater with no intercoat delamination within the new system.
 - 2) Areas not meeting minimum pull-off strength requirements shall have additional testing required at areas selected by Architect/Engineer.
 - 3) Areas not meeting minimum pull-off strength will be considered rejected and will be replaced at no cost to the Owner.
 4. Reinforcing Mesh: If reinforcing mesh is required, install sample section of reinforcing mesh in accordance with Installation/Application requirements.
- D. Use trial sections to determine adequacy of pre-application surface cleaning. Obtain Owner, Engineer and manufacturer acceptance of:
1. Cleaning before proceeding with traffic coating application.
 2. Visual appearance of finished coating application.
 3. Static coefficient of friction of 0.6, as advised in the Appendix to ADAAG
 4. Pull-off test to quantify traffic coating adhesion to concrete and existing traffic coating.
- E. Determine overall coating system mil thickness:
1. Contractor shall provide 6 in. by 6 in. bond breaker (coating coupon) on concrete surface for each 25,000 sq ft, or fraction thereof, of coating to be placed as directed by Engineer and manufacturer. Dimensionally locate coupon for easy removal.

2. Contractor shall assist Testing Agency in removing coating coupons from concrete surface at completion of manufacturer-specified cure period. Contractor shall repair coupon area per coating manufacturer's instructions.
3. Testing Agency shall determine dry mil thickness of completed Traffic Coating System, including bond breaker. Take 9 readings (minimum), 3 by 3 pattern at 2 in. on center. No reading shall be taken closer than 1 in. from coupon edge. Report individual readings and overall coating system average to Engineer. Readings shall be made with micrometer or optical comparator.

F. Adhesion Testing (ongoing testing during installation):

1. Perform three (3) adhesion pull -off tests in accordance with ASTM D7234, Standard Test Method for Pull-Off Strength of Coatings on Concrete Using Portable Adhesion Testers.
 - a. Perform testing for every [25,000 sf, 40,000 sf, Other].
 - b. The average of the tests shall be 200 psi or greater with no intercoat delamination within the new system.
 - c. Areas not meeting minimum pull-off strength requirements shall have additional testing required at areas selected by Architect/Engineer.
 - d. Areas not meeting minimum pull-off strength will be considered rejected and will be replaced at no cost to the Owner.

3.5 PROTECTING AND CLEANING

- A. Protect traffic coatings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 18 00

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SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.

1.3 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Reference Division 01 Specification Sections that apply to the preinstallation meeting requirements.
 - 1. Review waterproofing requirements including, but not limited to, the following:
 - a. Surface preparation specified in other Sections.
 - b. Minimum curing period.
 - c. Forecasted weather conditions.
 - d. Special details and sheet flashings.
 - e. Repairs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch wide joints formed between two 6-inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.
- C. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:
 - 1. Joint-sealant location and designation.
 - 2. Manufacturer and product name.
 - 3. Type of substrate material.
 - 4. Intended test.
 - 5. Number of samples required.
- D. Preconstruction Laboratory Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.
- E. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates.
- H. Field-Adhesion-Test Reports: For each sealant application tested.
- I. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this section.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.
 3. Submit manufacturer's recommended number of pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials.
 4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 5. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.
 6. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 2. Conduct field tests for each kind of sealant and joint substrate.
 3. Notify Architect/Engineer seven days in advance of dates and times when test joints will be erected.
 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.8 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.9 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Ten years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content: Sealants and sealant primers shall comply with the following:
 1. Architectural sealants shall have a VOC content of 250 g/L or less.
 2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.

3. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- C. Colors of Exposed Joint Sealants: As indicated by manufacturer's designations and selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, NT: Single-component, non-sag, plus 100 percent and minus 50 percent movement capability, non-traffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50/50, Use T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

- a. Dow Corning Corporation – Dow Corning Brand Parking Structure Sealants.

- B. Silicone, S, NS, 50, NT: Single-component, non-sag, plus 50 percent and minus 50 percent movement capability, non-traffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

- a. Dow Corning Corporation – Dow Corning 795.

2.3 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Non-staining; cylindrical Sealant Backings, ASTM C 1330, Type C, compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. Nomaco – SOFROD.
- b. BASF Corporation-Construction Systems.

- B. 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. Provide self-adhesive tape where applicable.

2.4 SELF-ADHERING MEMBRANE FLASHING AND SEALANT

- A. High-Temperature resistive self-adhering underlayment withstand temperatures up to 250 degree Fahrenheit (121 degree Celsius) under existing storefront sill metal flashing and strip-over roof termination counter-flashing.
 - 1. WIP 300HT; Carlisle. Or approved equivalent.
- B. Multi-component, chemical curing, low modulus, non-sag, polyurethane sealant.
 - 1. CCW-201; Carlisle. Or approved equivalent compatible with the self-adhering membrane flashing from the same manufacturer.

2.5 MISCELLANEOUS MATERIALS

- A. 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.
- B. 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.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant

- manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Brick masonry.
 3. Remove laitance and form-release agents from concrete.
 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

- F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 2. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. 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 kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
 - 3. 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 material, sealant configuration, and sealant dimensions.
 - 4. 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.

- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 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.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

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SECTION 07 92 33 –CONCRETE JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Materials shall be compatible with materials or related Work with which they come into contact, and with materials covered by this Section.
 - 2. Distribute reviewed submittals to all others whose Work is related.

3. Coordinate layout of joint system and approve methods for providing joints with precast concrete and concrete contractors.
 4. Inspect site and precast plant before precast production to insure proper joint configuration.
- B. Make submittals in accordance with requirements of Division 01 Section, "Submittal Procedures:"
1. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
 2. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.
- C. Submittals and Resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal data the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including the cost of Engineer's services made necessary to review such additional resubmittals. Owner shall in turn reimburse Engineer.
- D. Requests For Information
1. Engineer reserves the right to reject, unprocessed, any Request for Information (RFI) that the Engineer, at its sole discretion, deems frivolous.
 2. Engineer reserves the right to reject, unprocessed, any RFI that the Engineer, at its sole discretion, deems already answered in the Contract Documents.
 3. RFI process shall not be used for requesting substitutions. Procedures for substitutions are clearly specified elsewhere in the contract documents.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATION SUBMITTALS

- A. Certificates:

1. Evidence of installer's being certified by manufacturer. Evidence shall include complete copy of manufacturer's licensing/certification document, spelling out repair responsibility for warranty claims.
 2. Certification from the Manufacturer that joint details as specified are acceptable for system to be installed at least 1 month before placement of any concrete which will receive joint sealant.
- B. Field Quality Control:
1. Two copies each of manufacturer's technical representative's log for each visit.
 2. Testing agency field and test reports.
- C. Qualification Statements:
1. Manufacturer's qualifications as defined in the "Quality Assurance" article.
 2. Installer's qualifications as defined in the "Quality Assurance" article.
 3. Signed statement from this Section applicator certifying that applicator has read, understood, and shall comply with all requirements of this Section.

1.6 CLOSEOUT SUBMITTALS

- A. Final executed Warranty.

1.7 QUALITY ASSURANCE

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

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

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all materials to site in original, unopened containers, bearing following information:
 - 1. Name of product.
 - 2. Name of manufacturer.
 - 3. Date of preparation.
 - 4. Lot or batch number.
- B. Store materials under cover and protect from weather. Replace packages or materials showing any signs of damage with new material at no additional cost to Owner.

1.9 FIELD CONDITIONS

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

1.10 WARRANTY

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

2. Weathering.
 3. Abrasion or tear failure resulting from normal traffic use.
- B. If material surface shows any of defects listed above, supply labor and material to repair all defective areas and to repaint all damaged line stripes.
- C. Warranty period shall be a 5 year Joint and Several Warranty commencing with date of acceptance of work.
- D. Perform any repair under this warranty at no cost to Owner.
- E. Address the following in the terms of the Warranty: length of warranty, change in value of warranty – if any- based on length of remaining warranty period, transferability of warranty, responsibilities of each party, notification procedures, dispute resolution procedures, and limitations of liability for direct and consequential damages.
- F. Snowplows, vandalism, and abnormally abrasive maintenance equipment are not normal traffic use and are exempted from warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 MATERIALS, JOINT SEALANT SYSTEM

- A. Provide complete system of compatible materials designed by manufacturer to produce waterproof, traffic-bearing control joints as detailed on Drawings.
- B. Compounds used for sealants shall not stain masonry or concrete. Aluminum pigmented compounds not acceptable.
- C. Color of sealants shall match adjacent surfaces.
- D. Closed cell or reticulated backer rods: Acceptable products:
1. "Sof Rod," Nomaco Inc., 501 NMC Drive, Zebulon, NC 27597. (800) 345-7279 ext. 341.

2. "ITP Soft Type Backer Rod," Industrial Thermo Polymers Limited, 2316 Delaware Ave., Suite 216, Buffalo, NY 14216. (800) 387-3847.
 3. "MasterSeal 921 Backer Rod," BASF.
- E. Bond breakers and fillers: as recommended by system manufacturer.
- F. Primers: as recommended by sealant manufacturer.
- G. Acceptable sealants are listed below. Sealants shall be compatible with all other materials in this Section and related work.
- H. Acceptable polyurethane control joint sealants (traffic bearing):
1. MasterSeal SL-2 or MasterSeal SL-2 SG, BASF.
 2. Iso-flex 880 GB or Iso-flex 881, Lymtal.
 3. Dynatrol II-SG or Urexpan NR 200, Pecora.
 4. Sikaflex-2c SL or Sikaflex-2c NS TG, Sika.
 5. THC-901, Vulkem 45SSL, Dymeric 240 FC or Dymonic 100, Tremco.
- I. Acceptable polyurethane vertical and cove joints sealants (non-traffic bearing):
1. Sikaflex-2c NS EZ, Sika.
 2. MasterSeal NP-2, BASF.
 3. Dymeric 240FC, Dymonic 100 or THC 901 (cove only), Tremco.
 4. Dynatred, Pecora.
 5. Iso-flex 881, Lymtal.
- J. Acceptable silicone vertical and cove joint sealants (non-traffic bearing):
1. Spectrem 1 or Spectrem 4-TS, Tremco.
 2. 311-NS, Pecora.
 3. Dow Corning NS Parking Structure Sealant, Dow Corning.
- K. Substitutions: None for this project.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive Work and report immediately in writing to Engineer/Architect any deficiencies in surface which render it unsuitable for proper execution of Work.
- B. Coordinate and verify that related Work meets following requirements before beginning installation
1. Concrete surfaces are finished as acceptable for system to be installed.

2. Curing compounds used on concrete surfaces are compatible with system to be installed.
3. Concrete surfaces have completed proper curing period for system selected.

3.2 PREPARATION

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

3.3 INSTALLATION/APPLICATION

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

3.4 FIELD QUALITY CONTROL

- A. Contractor and Engineer/Architect will jointly determine which one of following 2 methods of sealant testing to verify sealant profile:
 - 1. Contractor, at Engineer/Architect's direction, shall cut out lesser of 1% of total lineal footage placed or total of 100 lineal ft of joint sealant at isolated/random locations (varying from in. to ft of material) for Engineer/Architect and Manufacturer's Representative inspection of sealant profile.
 - 2. Contractor, at Engineer/Architect's direction, shall install 3 trial joint sections of 20 ft each. Contractor shall cut out joint sections, as selected by Engineer/Architect, for Engineer/Architect and Manufacturer's Representative inspection. Additional isolated/random removals may be required where sealant appears deficient. Total cut out sealant shall not exceed lesser of 1% of total lineal footage placed or total of 100 lineal ft of joint sealant at isolated/random locations (varying from in. to ft of material) for Engineer/Architect and Manufacturer's Representative inspection of sealant profile.
- B. Repair all random joint sealant "cut out" sections at no cost to Owner.
- C. Testing Agency:
 - 1. Check shore hardness per ASTM standard specified in sealant manufacturer's printed data.
 - 2. If flood test of joints required by this Section, report results to Engineer/Architect.

END OF SECTION 07 92 33

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SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of high-performance coating systems, on the following substrates:
 - 1. Interior Substrates:
 - a. Steel.
- B. Related Requirements:
 - 1. Division 05, Section "Structural Steel Framing" for shop priming of structural steel with primers specified in this Section.

1.3 DEFINITIONS

- A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the specified product highlighted.
 - 2. Indicate VOC content.
- B. Sustainable Design Submittals:
 - 1. Product Data: For paints and coatings, indicating VOC content.
 - 2. Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for low-emitting materials.

- C. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each coating system.
 - a. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Behr Process Corporation.
 - 2. Benjamin Moore & Co.
 - 3. Comex Industrial Coatings; Comex Group.
 - 4. Corotech Coatings; Benjamin Moore & Co.
 - 5. Devoe Paint Company; Akzo Nobel.
 - 6. Diamond Vogel Paints.
 - 7. Dulux (formerly ICI Paints); a brand of AkzoNobel.
 - 8. PPG Architectural Finishes, Inc.
 - 9. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
 - 10. Sherwin-Williams Company (The).
 - 11. Tnemec Inc.
- B. Products: Subject to compliance with requirements, provide one of the products listed in the Exterior High-Performance Coating Schedule or Interior High-Performance Coating Schedule for the coating category indicated.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

3. Products shall be of same manufacturer for each coat in a coating system.
- C. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
1. Flat Paints and Coatings: 50 g/L.
 2. Nonflat Paints and Coatings: 50 g/L.
 3. Primers, Sealers, and Undercoaters: 100 g/L.
 4. Rust-Preventive Coatings: 100 g/L.
 5. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
- D. Low-Emitting Materials: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.3 SOURCE QUALITY CONTROL

- A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Concrete: 12 percent.
 2. Masonry (Clay and CMUs): 12 percent.

3. Gypsum Board: 12 percent.
 4. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:
1. SSPC-SP 7/NACE No. 4.
 2. SSPC-SP 11.
 3. SSPC-SP 6/NACE No. 3.
 4. SSPC-SP 10/NACE No. 2.
 5. SSPC-SP 5/NACE No. 1.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for coating and substrate indicated.
 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
1. Contractor shall touch up and restore coated surfaces damaged by testing.
 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. Steel Substrates:
 - 1. Epoxy System:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss.
 - 2. High-Build Epoxy over Epoxy Zinc-Rich Primer System:
 - a. Prime Coat: Primer, zinc-rich, epoxy.
 - b. Intermediate Coat: Epoxy, high build, low gloss.
 - c. Topcoat: Epoxy, gloss.
 - d. Topcoat: Epoxy, high-build, low gloss.
 - 3. Epoxy over Self-Priming Epoxy System:
 - a. Prime Coat: Epoxy, high build, self-priming.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss.
 - 4. Epoxy, High-Build System:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal.
 - b. Intermediate Coat: High-build epoxy, matching topcoat.
 - c. Topcoat: High-build epoxy, low gloss.
 - d. Topcoat: High-build epoxy, gloss.
 - 5. Epoxy Deck Coating System:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal.
 - b. Intermediate Coat: Epoxy, gloss.
 - c. Topcoat: Epoxy deck coating (slip resistant).
 - 6. Epoxy-Modified Latex System:
 - a. Prime Coat: Primer, rust inhibitive, water based.
 - b. Intermediate Coat: Epoxy-modified latex, interior, matching topcoat.
 - c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5).

- d. Topcoat: Epoxy-modified latex, gloss (MPI Gloss Level 6).
- 7. Pigmented Polyurethane over Epoxy Primer System:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal.
 - b. Intermediate Coat: Polyurethane, two components, pigmented, matching topcoat.
 - c. Topcoat: Polyurethane, two components, pigmented, gloss (MPI Gloss Level 6).
- 8. Pigmented Polyurethane over High-Build Epoxy System:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal.
 - b. Intermediate Coat: Epoxy, high build.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6).
- 9. Pigmented Polyurethane over Self-Priming Epoxy System:
 - a. Prime Coat: Epoxy, high build, self-priming.
 - b. Intermediate Coat: Polyurethane, two component, pigmented, matching topcoat.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6).
- 10. Pigmented Polyurethane over Inorganic Zinc and Epoxy System:
 - a. Prime Coat: Primer, zinc rich, inorganic.
 - b. Intermediate Coat: Epoxy, gloss.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6).
- 11. Pigmented Polyurethane over Epoxy Zinc-Rich and Epoxy System:
 - a. Prime Coat: Primer, zinc rich, epoxy.
 - b. Intermediate Coat: Epoxy, gloss.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6).

B. Galvanized-Metal Substrates:

- 1. Epoxy over Epoxy Primer System:

- a. Prime Coat: Primer, epoxy, anti-corrosive, for metal.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss.
2. Epoxy over Vinyl Wash Primer and Epoxy Primer System:
- a. Prime Coat: Primer, vinyl wash.
 - b. Intermediate Coat: Primer, epoxy, anti-corrosive, for metal.
 - c. Topcoat: Epoxy, gloss.

END OF SECTION 09 96 00

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WALKER CONSULTANTS PROJECT NUMBER: 27-001211.01

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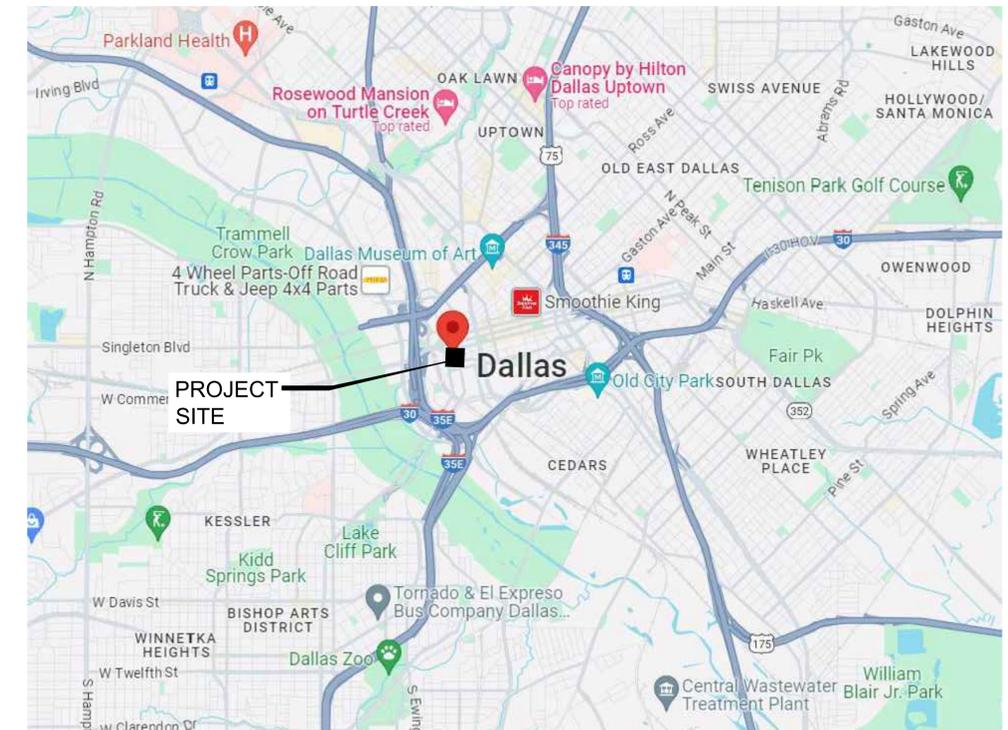


IMAGE SOURCE: GOOGLE MAPS

LOCATION MAP 



06/12/2025
Anirudh S. Goel

Texas Registered Engineering Firm F-004168

ADDENDUM 3
06/12/2025

GENERAL

- 1. INFORMATION SHOWN REGARDING EXISTING STRUCTURE USED IN THE DEVELOPMENT OF THESE DRAWINGS AND NOTES HAS BEEN BASED UPON THE DRAWINGS PROVIDED TO WALKER CONSULTANTS (WALKER).
- 2. PROVIDE NECESSARY PROTECTION/CONTAINMENT AND DISPOSAL MEASURES TO COMPLETE THE WORK.
- 3. VERIFY DIMENSIONS AND CONDITIONS IN THE FIELD. DO NOT SCALE DRAWINGS. DIMENSIONS SHOWN ON THE DRAWINGS ARE TAKEN FROM THE ORIGINAL CONSTRUCTION DOCUMENTS AND ARE PROVIDED FOR INFORMATION ONLY.
- 4. VERIFY QUANTITIES, QUANTITIES SHOWN ARE FOR ESTIMATING PURPOSES ONLY. VERIFY EXISTING CONDITIONS AT THE JOB SITE PRIOR TO STARTING THE WORK AND IMMEDIATELY NOTIFY WALKER OF ANY DISCREPANCIES, OMISSIONS, OR OTHER CONDITIONS THAT MAY AFFECT THE SCOPE OF WORK PRIOR TO BEGINNING REPAIRS RELATED TO THE NOTED CONDITIONS.
- 5. COMPLY WITH THE RULES AND REGULATIONS APPLICABLE TO THE DALLAS COUNTY, THE STATE OF TEXAS, OSHA, AND AUTHORITIES HAVING JURISDICTION.
- 6. LEAVE INTACT AND UNDISTURBED ELEMENTS THAT ARE TO REMAIN.
- 7. FURNISH AND PAY FOR ALL LABOR, MATERIALS, AND EQUIPMENT AS REQUIRED TO COMPLETE THE WORK. SECURE AND PAY FOR PERMITS, LICENSES AND GOVERNMENT FEES AS REQUIRED. COMPLY WITH CODES, ORDINANCES, RULES, REGULATIONS, ORDERS, AND OTHER LEGAL REQUIREMENTS OF PUBLIC AUTHORITY, WHICH BEAR ON THE PERFORMANCE OF THE WORK.
- 8. PROMPTLY SUBMIT VERBAL AND WRITTEN NOTICE TO WALKER OF OBSERVED VARIANCE OF THE CONTRACT DOCUMENTS FROM ACTUAL ON-SITE CONDITIONS.
- 9. SUPPLY THE OWNER WITH MATERIAL SAFETY DATA SHEETS (MSDS) FOR EACH CHEMICAL THAT WILL BE BROUGHT ON TO THE JOB SITE AND SHALL COMPLY WITH THE REQUIREMENTS OF THE OSHA HAZARD COMMUNICATION STANDARD.
- 10. SUBMIT DEMOLITION AND CONSTRUCTION SCHEDULES TO THE OWNER AND WALKER FOR APPROVAL PRIOR TO BEGINNING DEMOLITION.
- 11. THE PRODUCTS SPECIFIED ARE BELIEVED TO HAVE PROPERTIES ADEQUATE FOR SUCCESSFUL COMPLETION OF THE WORK. IF THE CONTRACTOR HAS FOUND THESE PRODUCTS TO BE UNACCEPTABLE OR HAS DIFFICULTY USING THESE MATERIALS, IMMEDIATELY INFORM WALKER.
- 12. WALKER WILL NOT HAVE CONTROL, OVER OR CHARGE OF AND WILL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES, OR FOR SAFETY PRECAUTIONS AND SAFETY PROGRAMS IN CONNECTION WITH THE PROJECT. SINCE THESE ARE THE RESPONSIBILITY OF OTHERS, WALKER WILL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S SCHEDULES OR FAILURE TO CARRY OUT THE PROJECT IN ACCORDANCE WITH CONTRACT DOCUMENTS. WALKER WILL NOT HAVE CONTROL, OVER OR CHARGE OF ACTS OR OMISSIONS OF THE CONTRACTOR, SUB-CONTRACTORS, OR THEIR AGENTS OR EMPLOYEES, OR OF OTHER NON-WALKER PERSONS PERFORMING PORTIONS OF THE PROJECT.
- 13. LIMIT ON-SITE STORAGE OF MATERIALS TO THOSE AREAS IDENTIFIED BY THE OWNER. DO NOT UNREASONABLY ENCUMBER THE SITE WITH MATERIALS OR EQUIPMENT. DO NOT LOAD THE STRUCTURE WITH WEIGHT THAT WILL ENDANGER THE STRUCTURE. ASSUME FULL RESPONSIBILITY FOR THE PROTECTION AND SAFEKEEPING OF PRODUCTS STORED ON THE PREMISES. MOVE STORED MATERIAL OR PRODUCTS THAT INTERFERE WITH THE OPERATIONS OF THE OWNER. ONLY STORE MATERIAL IN AREAS PROVIDED BY THE OWNER.
- 14. TAKE WATER AND ELECTRICITY ONLY FROM AREAS IDENTIFIED BY THE OWNER.
- 15. PROVIDE AND MAINTAIN REQUIRED DUST BARRIERS, CANOPIES, BARRICADES, PROTECTION AND WARNING LIGHTS IN GOOD CONDITION UNTIL THE COMPLETION OF THE WORK REQUIRING SUCH PROTECTION AND THEN REMOVE THE SAME. CANOPIES AND BARRICADES SHALL COMPLY WITH FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS.
- 16. MAINTAIN PREMISES FREE FROM ACCUMULATIONS OF WASTE MATERIAL AND RUBBISH. REMOVE AND DISPOSE OF IN A PROPER MANNER (OFF-SITE) EXISTING MATERIAL REMOVED FROM THE BUILDING DURING THE COURSE OF THE WORK ON A DAILY BASIS. REMOVAL AND DISPOSAL SHALL BE SATISFACTORY TO THE ENGINEER AND THE OWNER.
- 17. RETURN DAMAGED AREAS TO ORIGINAL CONDITIONS.
- 18. COSTS CAUSED BY ILL-TIMED WORK, DEFECTIVE WORK OR WORK NOT CONFORMING TO THE CONTRACT DOCUMENTS, ARE THE RESPONSIBILITY OF THE CONTRACTOR.
- 19. PROVIDE SHORING, BRACING AND SUPPORT AS REQUIRED TO MAINTAIN THE STRUCTURAL INTEGRITY OR THE EXISTING CONSTRUCTION DURING THE WORK. CONSTRUCTION DEBRIS SHALL BE REMOVED IN A MANNER THAT AVOIDS OVERLOADING ADJACENT STRUCTURAL MEMBERS.
- 20. THE CONTRACTOR AND RESPECTIVE SUB-CONTRACTORS SHALL EACH HAVE FIVE OR MORE YEARS EXPERIENCE PERFORMING REPAIR WORK SIMILAR IN SIZE, TYPE, AND COMPLEXITY TO WHAT IS SHOWN IN THE CONTRACT DOCUMENTS.
- 21. WHERE A DETAIL IS SHOWN FOR ONE CONDITION, IT SHALL APPLY FOR ALL LIKE OR SIMILAR CONDITIONS EVEN THOUGH NOT SPECIFICALLY MARKED ON DRAWINGS.
- 22. CONSTRUCTION SHALL BE SUBJECT TO REVIEW BY WALKER BEFORE IT IS CONCEALED FROM VIEW. COORDINATE EXPECTED REVIEW ITEMS WITH WALKER PRIOR TO THE START OF CONSTRUCTION AND PROVIDE REASONABLE NOTIFICATION TO WALKER TO ALLOW FOR SUCH REVIEW AS THE WORK PROCEEDS.
- 23. COORDINATE USE OF PREMISES UNDER THE DIRECTION OF THE OWNER. DO NOT BLOCK EXISTING MEANS OF EGRESS. MAINTAIN SAFE ACCESS TO AND EGRESS FROM THE BUILDING AT ALL TIMES. CONTRACTOR SHALL BE RESPONSIBLE FOR COSTS RESULTING FROM WORK STOPPAGES OR DELAYS CAUSED BY CONTRACTORS' LACK OF COORDINATION WITH THE OWNER.
- 24. PROPERLY PROTECT AND MAKE SAFE ADJACENT PROPERTIES AND RESIDENTS' PROPERTY AS JOB CONDITIONS REQUIRE.
- 25. WALKER IS NOT RESPONSIBLE FOR CONSTRUCTION THAT VARIES FROM THE WORK ILLUSTRATED AND SPECIFIED IN THE CONTRACT DOCUMENTS.
- 26. THE CONTRACTOR IS RESPONSIBLE FOR ELEMENTS OF CONSTRUCTION NOT SPECIFICALLY DETAILED THAT ARE NECESSARY TO COMPLETE THE WORK SHOWN.
- 27. IN THE EVENT OF CONFLICT BETWEEN THE DRAWINGS, NOTIFY WALKER.
- 28. ANY REQUESTS FOR SUBSTITUTION OR CHANGES TO THE REPAIRS NEEDS TO BE SUBMITTED TO WALKER FOR REVIEW DURING THE PROCUREMENT PROCESS AND PRIOR TO A CONSTRUCTION CONTRACT BEING EXECUTED. AFTER A CONSTRUCTION CONTRACT IS EXECUTED, THE CONTRACTOR GUARANTEES THAT THESE DRAWINGS ARE FREE OF ERROR AND COMPLETE TO PERFORM THE WORK WITHOUT CHANGE ORDERS.

CONSTRUCTION

- 1. THE CONTRACTOR SHALL PERFORM WORK IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES, LAWS AND ORDINANCES. THE CONTRACTOR SHALL PROMPTLY NOTIFY WALKER OF ANY KNOWN NONCONFORMITY WITH THE INTENT OF THE CONSTRUCTION DOCUMENTS AND AS-BUILT CONDITIONS TO THE APPLICABLE CODES, LAWS OR ORDINANCES AND REQUEST CLARIFICATION FROM THE ENGINEER PRIOR TO PROCEEDING WITH WORK WHICH IS DEEMED IN CONFLICT WITH THE APPLICABLE CODES, LAWS OR ORDINANCES.
- 2. FIRE SAFETY DURING CONSTRUCTION, ALTERATION OR DEMOLITION SHALL COMPLY WITH 2018 NFPA 1.
- 3. PRIOR TO FABRICATION OF ANY MATERIAL OR PLACEMENT OF CONCRETE, FIELD VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS SHOWN ON DRAWINGS. REPORT ALL DISCREPANCIES TO WALKER IMMEDIATELY.
- 4. DO NOT SCALE DRAWINGS.

CONSTRUCTION DOCUMENTS

- 1. THE EXTENT OF REPAIR AREAS SHOWN ON DRAWING SERIES R-500, AND ARE WALKER'S ESTIMATES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXTENT AND LOCATIONS OF REPAIR AREAS. THE ACTUAL REPAIR QUANTITIES SHALL BE VERIFIED AND AGREED UPON BY WALKER PRIOR TO COMMENCING THE REPAIR WORK.
- 2. WORK SHALL BE PERFORMED IN COORDINATION WITH CONSTRUCTION OBSERVATIONS BY WALKER TO DETERMINE IF THE EXPOSED EXISTING CONSTRUCTION IS AS ASSUMED IN THE DESIGN.
- 3. DIMENSIONS SHOWN ON PLANS ARE BASED ON ORIGINAL CONSTRUCTION DOCUMENTS. THE CONTRACTOR IS REQUIRED TO FIELD VERIFY ALL CONDITIONS FOR THE PURPOSE OF PERFORMING THE WORK.
- 4. REFER TO SPECIFICATIONS FOR SCOPE, DESCRIPTION AND REQUIREMENTS OF WORK.

DETAILS AND SYMBOLS

- 1. REPAIR DETAILS ARE SHOWN ON DRAWING SERIES R-500, AND ARE IDENTIFIED AS TWO-DIGIT (X,X) DETAILS.
- 2. WHERE THE WORK ITEM BUBBLE IS NOTED "TYP," IT MEANS THE WORK ITEM OCCURS AT ALL LOCATIONS WHERE THE APPLICABLE DETRIORATION OR DESIGNATION SYMBOL OCCURS ON THAT PLAN.
- 3. WHERE "T.A.R." IS NOTED, IT MEANS THERE MAY BE AREAS OF THIS WORK IN ADDITION TO THE PARTICULAR DESIGNATED AREAS.
- 4. WHERE TWO OR MORE WORK ITEM BUBBLES ARE GROUPED TOGETHER, IT MEANS ALL OF THE REFERENCED WORK ITEMS SHALL BE APPLIED.
- 5. WHEN A WORK ITEM OF DETAIL IS LISTED AS INCIDENTAL, THIS WORK IS INCLUDED IN THE PAY UNIT OF OTHER WORK ITEMS AND DOES NOT HAVE A SEPARATE PRICE.
- 6. WHEN A DETAIL IS LABELED (FOR REFERENCE ONLY) IT PROVIDES INFORMATION ONLY ABOUT INCIDENTAL WORK AND DOES NOT HAVE A PAY UNIT.
- 7. CONTRACTOR IS RESPONSIBLE FOR DETERMINING ACTUAL EXTENT AND LOCATIONS OF REPAIR AREAS IN ACCORDANCE WITH THE SPECIFICATIONS; WORK ITEM IS SHOWN ONLY TO REPRESENT THE TYPES OF DETRIORATION. SEE WORK ITEM SPECIFICATION INFORMATION REGARDING DETAILS.

EXAMINATION OF CONTRACT DOCUMENTS AND SITE

- 1. TO WALKER'S KNOWLEDGE, NO OUTSTANDING ENVIRONMENTAL CONCERNS ARE PRESENT ON SITE. IF AN OUTSTANDING ENVIRONMENTAL CONCERN IS IDENTIFIED DURING CONSTRUCTION, THE CONTRACTOR IS TO BRING THIS TO THE ATTENTION OF WALKER AND OWNER.
- 2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FAMILIARIZE ITSELF WITH THE ORIGINAL CONSTRUCTION DRAWINGS FOR THE WORK AREAS. ALL SIGNIFICANT DEVIATIONS ARE TO BE BROUGHT TO THE ATTENTION OF WALKER.

EXISTING SERVICES AND UTILITIES

- 1. CONTRACTOR SHALL REVIEW ALL EXISTING CONDITIONS TO DETERMINE ALL ELECTRICAL AND MECHANICAL SERVICES AND UTILITIES AFFECTED BY THE REPAIR WORK. MAKE NECESSARY TEMPORARY CONNECTIONS TO MAINTAIN EXISTING SERVICES TO ALL AREAS OF THE PARKING GARAGE OR TO OTHER AREAS (NOT IN CONTRACT) AFFECTED BY THE WORK. THE CONTRACTOR SHALL SUBMIT THE METHODS AND SCHEDULE OF CONNECTIONS FOR THE OWNER'S APPROVAL PRIOR TO COMMENCEMENT.

CONSTRUCTION PHASING, SEQUENCING AND TRAFFIC MAINTENANCE

- 1. THE CONTRACTOR IS RESPONSIBLE FOR COLLECTION AND REMOVAL OF ALL CONSTRUCTION DEBRIS ON A DAILY BASIS, AND THE SITE SHALL BE LEFT IN A NEAT AND ORDERLY CONDITION, SATISFACTORY TO THE OWNER.
- 2. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL ADJACENT STRUCTURES, LANDSCAPING, AND OTHER SURFACES AND ITEMS WHICH COULD BE AFFECTED BY THE WORK.

APPLICABLE CODES AND STANDARDS

ALL WORK SHALL BE IN ACCORDANCE WITH THE CURRENT BUILDING CODE FOR DALLAS COUNTY, TEXAS, INCLUDING ALL LOCAL AMENDMENTS. THE PUBLICATIONS LISTED BELOW ARE THE GOVERNING CODES AND STANDARDS AND ARE REFERENCED BY THE BASIC DESIGNATION. IN THE CASE OF CONFLICTING REQUIREMENTS, THE BUILDING CODE SHALL GOVERN.

Table with 2 columns: Code Name, Description. Includes BUILDING CODE 2021 INTERNATIONAL BUILDING CODE, ASCE AMERICAN SOCIETY OF CIVIL ENGINEERS, etc.

WELDING

- 1. WHERE WELDING OF REINFORCING BARS IS APPROVED BY WALKER, IT SHALL BE DONE BY AWS CERTIFIED WELDERS USING E70XX OR APPROVED ELECTRODES. WELDING PROCEDURES SHALL CONFORM TO THE REQUIREMENTS OF THE "STRUCTURAL WELDING CODE - STEEL", AWS-D14

PROTECTION OF EXISTING UTILITIES AND STRUCTURES

- 1. SUBSURFACE OBSTRUCTIONS: TAKE NECESSARY PRECAUTIONS TO PROTECT EXISTING UTILITIES FROM DAMAGE DUE TO ANY CONSTRUCTION ACTIVITY. THE CONTRACTOR SHALL LOCATE EXISTING UTILITIES, CULVERTS, AND STRUCTURES (ABOVE OR BELOW GROUND), BEFORE ANY EXCAVATION STARTS AND COORDINATE WORK WITH UTILITY COMPANIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING UTILITY COMPANIES WHEN WORKING WITHIN THE VICINITY OF THE EXISTING UTILITIES. OMISSION FROM OR INCLUSION OF LOCATED UTILITY ITEMS ON PLANS DO NOT CONSTITUTE NON-EXISTENT OR DEFINITE LOCATION. SECURE AND EXAMINE LOCAL UTILITY SURVEYOR RECORDS FOR AVAILABLE LOCATION DATA INCLUDING BUILDING SERVICE LINES.
- 2. UNLESS SHOWN TO BE REMOVED, PROTECT ACTIVE UTILITY LINES SHOWN ON THE DRAWINGS OR OTHERWISE MADE KNOWN TO THE CONTRACTOR PRIOR TO TRENCHING. IN EXCAVATING, CARE MUST BE TAKEN NOT TO REMOVE OR INJURE ANY SUBSURFACE STRUCTURE. ALL EXISTING GAS PIPES, WATER PIPES, STEAM PIPES, TELEPHONE LINES, CABLE TV LINES, ELECTRICAL CONDUITS, SEWERS, DRAINS, FIRE HYDRANTS, AND OTHER STRUCTURES WHICH, IN THE OPINION OF THE UTILITY COMPANY, DO NOT REQUIRE RELOCATION SHALL BE CAREFULLY SUPPORTED, SHORED UP, THE FLOW MAINTAINED, IF APPLICABLE, AND THE LINE/MAN PROTECTED. THE UTILITY SHALL BE RESTORED, AT THE CONTRACTOR'S EXPENSE, BY THE APPROPRIATE UTILITY TO ORIGINAL OR BETTER CONDITION. WHERE PIPES, CONDUITS, OR SEWERS ARE REMOVED FROM A TRENCH LEAVING DEAD ENDS IN THE GROUND, SUCH ENDS SHALL BE CAREFULLY PLUGGED OR BULKHEADED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO PERSONS OR PROPERTY CAUSED BY SUCH BREAKS.
- 3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANTICIPATING AND LOCATING UNDERGROUND UTILITIES AND OBSTRUCTIONS. WHEN CONSTRUCTION APPEARS TO BE IN CLOSE PROXIMITY TO EXISTING UTILITIES, THE TRENCH(ES) SHALL BE OPENED A SUFFICIENT DISTANCE AHEAD OF THE WORK OR TEST PITS MADE TO VERIFY THE EXACT LOCATIONS AND INVERTS OF THE UTILITY TO ALLOW FOR CHANGES IN LINE AND GRADE.
- 4. IF ACTIVE UTILITY LINES ARE ENCOUNTERED, ARE NOT SHOWN ON THE DRAWINGS OR OTHERWISE MADE KNOWN TO THE CONTRACTOR, PROMPTLY TAKE NECESSARY STEPS TO ASSURE THAT SERVICE IS NOT INTERRUPTED.

TESTING AND INSPECTION REQUIREMENTS

- 1. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE ENGINEER.
- 2. THE CONTRACTOR SHALL SECURE THE SERVICES OF AN INDEPENDENT TESTING AND INSPECTION AGENCY TO PERFORM ALL REQUIRED MATERIAL TESTS AND INSPECTIONS, WHERE APPLICABLE. AGENCY SHALL BE EMPLOYED BY CONTRACTOR, AND APPROVED BY ENGINEER AND BUILDING OFFICIAL. TEST AND INSPECTION REPORTS SHALL BE SUBMITTED FOR APPROVAL TO ENGINEER AND BUILDING OFFICIAL, AND CONFORM TO REQUIREMENTS OF THE 2021 IBC.
- 3. SPECIAL INSPECTOR SHALL KEEP RECORDS OF INSPECTIONS. THE SPECIAL INSPECTOR SHALL FURNISH INSPECTION REPORTS TO THE OWNER, LICENSED ENGINEER OF RECORD AND OTHER DESIGNATED PERSONS.
- 4. IN THE EVENT THAT ELEMENTS, MEMBERS, OR CONNECTIONS DO NOT ACHIEVE THE SPECIFIED MINIMUM REQUIREMENTS, THE ENGINEER MAY REQUIRE ADDITIONAL ANALYSIS. TESTING OR REMOVAL AND REPLACEMENT OF MEMBERS, ANY AND ALL SUCH ADDITIONAL ANALYSIS OR TESTING SHALL BE AT THE CONTRACTOR'S EXPENSE. REPLACEMENT OF ANY MEMBERS DEEMED QUESTIONABLE OR INADEQUATE BY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.

SPECIAL INSPECTIONS REQUIRED BY CODE

- 1. THE FOLLOWING MATERIALS AND WORK OF THIS PROJECT REQUIRE SPECIAL INSPECTIONS IN ACCORDANCE WITH SECTION 1704 OF THE INTERNATIONAL BUILDING CODE:

Table with 3 columns: Required Verification and Inspection, Cont., Periodic. Includes A. CONCRETE AND STEEL REPAIRS, B. WATERPROOFING AND MISCELLANEOUS ITEMS.

FIRE PROTECTION

- 1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIRE PROTECTION AND FIRE WATCH DURING ALL CONSTRUCTION OPERATIONS.
- 2. NO SMOKING SHALL BE PERMITTED IN THE BUILDING. CONTRACTOR SHALL PROVIDE AND MAINTAIN TEMPORARY FIRE EXTINGUISHERS UNTIL SUBSTANTIAL COMPLETION.

GENERAL CONCRETE REQUIREMENTS

- 1. PREPACKAGED REPAIR MATERIAL (033760)
COMPRESSIVE STRENGTH 5000 PSI AT 28 DAYS
WALKER SHALL BE NOTIFIED A MINIMUM OF 24 HOURS FOR OBSERVATION OF PREPARED CONCRETE SURFACES.
- 2. INSTALL COARSE TRANSVERSE SCORED TEXTURE BY DRAWING BROOM ACROSS SURFACE OF ALL CONCRETE.

CONCRETE PROTECTION FOR REINFORCEMENT:

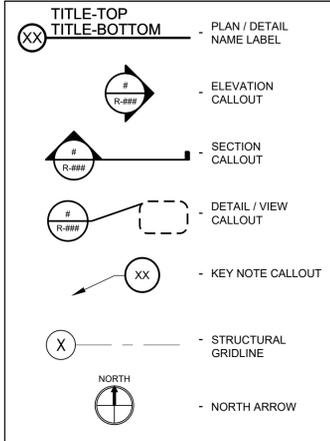
- 1. THE FOLLOWING APPLIES FOR FULL SECTION REPLACEMENT WHERE SHOWN ON DRAWINGS.
- 2. THE MINIMUM CONCRETE PROTECTION FOR REINFORCEMENT SHALL PER ACI 318-19 SECTION 20.6.1.3
- 3. MINIMUM COVER FOR REINFORCING IN NON-PRE-STRESSED CONCRETE AND NON-POST-TENSIONED MEMBERS.

Table with 2 columns: Description, Minimum Concrete Cover (Inches). Includes (A) CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH, (B) CONCRETE EXPOSED TO EARTH OR WEATHER, etc.

SHORING AND BRACING

- 1. CONTRACTOR SHALL PROVIDE ALL SHORING, BRACING, SHEETING, ETC. REQUIRED FOR SAFETY AND PROPER EXECUTION OF THE WORK.
- 2. THE DESIGN OF THE SHORING AND BRACING MEMBERS SHALL INCLUDE ALL CHANGES IN THE STRUCTURE CAUSED BY THE SHORING AND BRACING.
- 3. SHORING MEMBERS SHALL BE ADJUSTABLE, AND THE SHORING SHALL BE INSTALLED TIGHTLY BETWEEN THE FLOOR AND CEILING.
- 4. SHORING SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF TEXAS. CONTRACTOR TO SUBMIT SEALED SHORING DRAWINGS TO WALKER FOR REVIEW.

COMMON SYMBOLS LEGEND



ABBREVIATIONS

Table with 2 columns: Conc., Concrete. Includes C.J. CONTROL JOINT, C.F.V. CONTRACTOR FIELD VERIFY, DT DOUBLE TEE, etc.

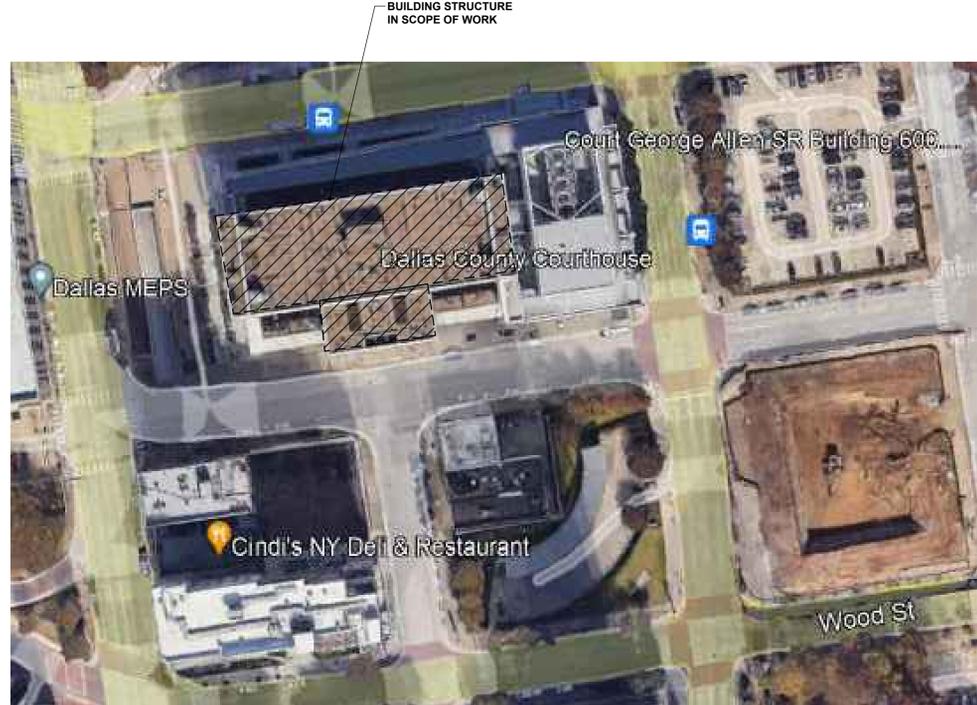


IMAGE SOURCE: GOOGLE EARTH

SCHEMATIC SITE PLAN



GEORGE ALLEN COURTHOUSE BUILDING REPAIRS



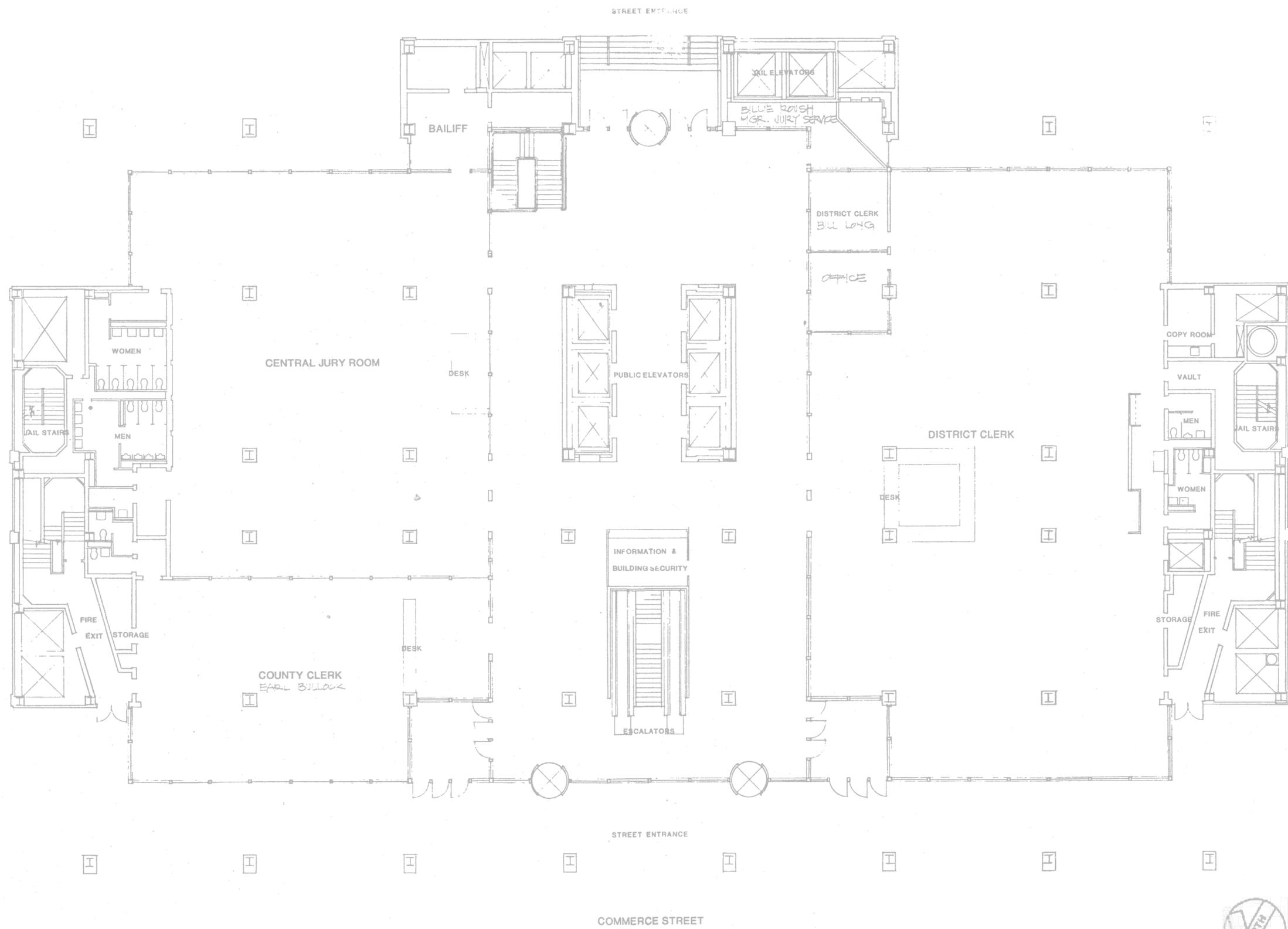
Texas Registered Engineering Firm F-004168

Table with 4 columns: Mark, Date, Description, Issued. Includes ADDENDUM 3 ISSUED FOR BIDDING on 08/09/2024.

Table with 2 columns: Field, Value. Includes PROJECT NO: 27-001211.01, DRAWN BY: CC, CHECKED BY: ASG.

SHEET TITLE: GENERAL NOTES AND SITE PLAN
R-001

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CHUDIWAL, CHAITANYA



1 PLAZA LEVEL - FIRST FLOOR PLAN

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281.280.0668 Ph
www.walkerconsultants.com
Texas Registered Engineering Firm
F-004168

STATE OF TEXAS
ANIRUDH S. GOEL
145803
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Texas Registered Engineering Firm F-004168

**GEORGE ALLEN COURTHOUSE
BUILDING REPAIRS**

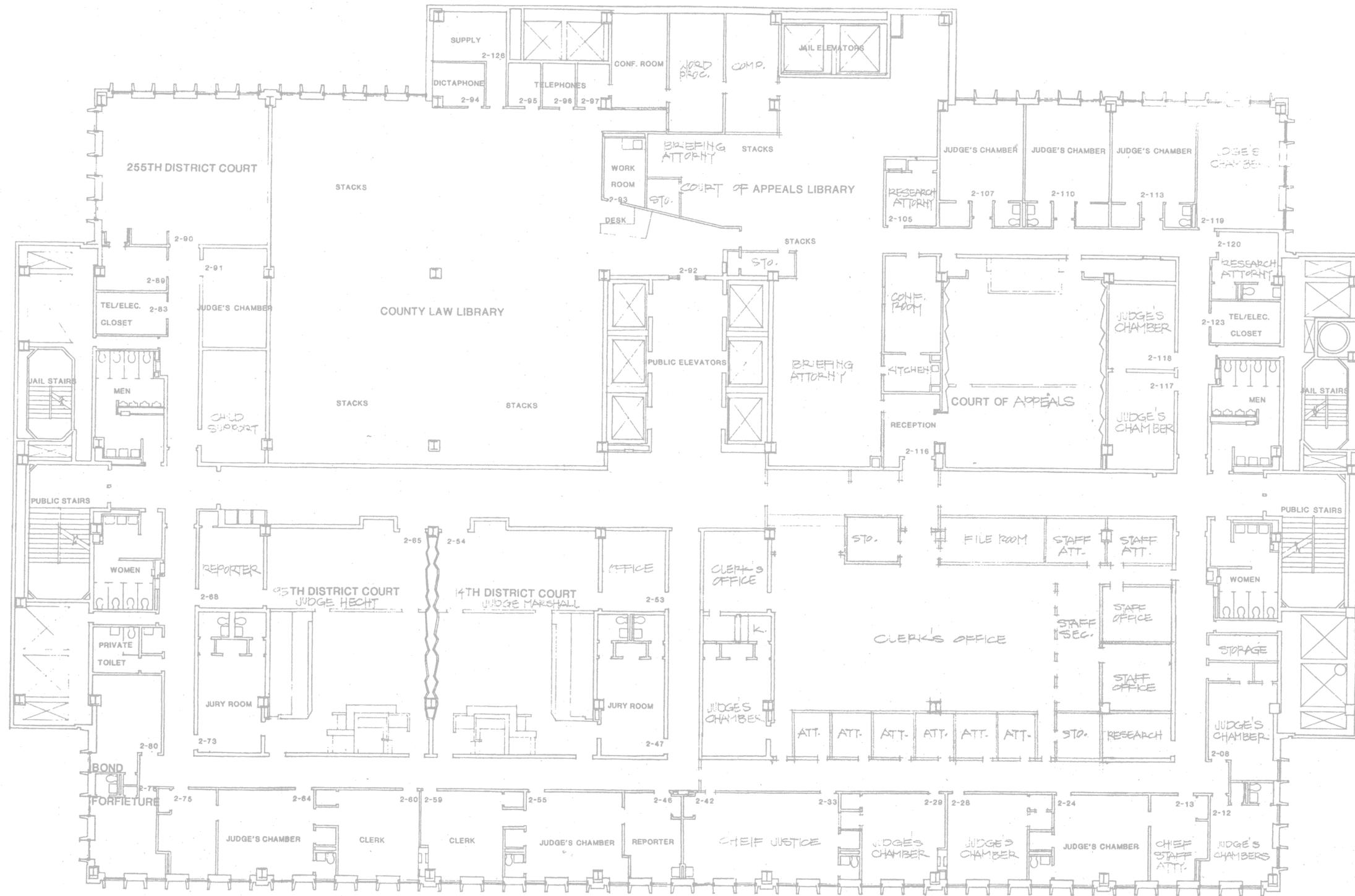
DALLAS TEXAS

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	08/09/2024	ISSUED FOR BIDDING	

PROJECT NO: 27-001211.01
DRAWN BY: CC
CHECKED BY: ASG
SHEET TITLE:
PLAZA LEVEL -
FIRST FLOOR PLAN

R-102

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1 SECOND FLOOR PLAN

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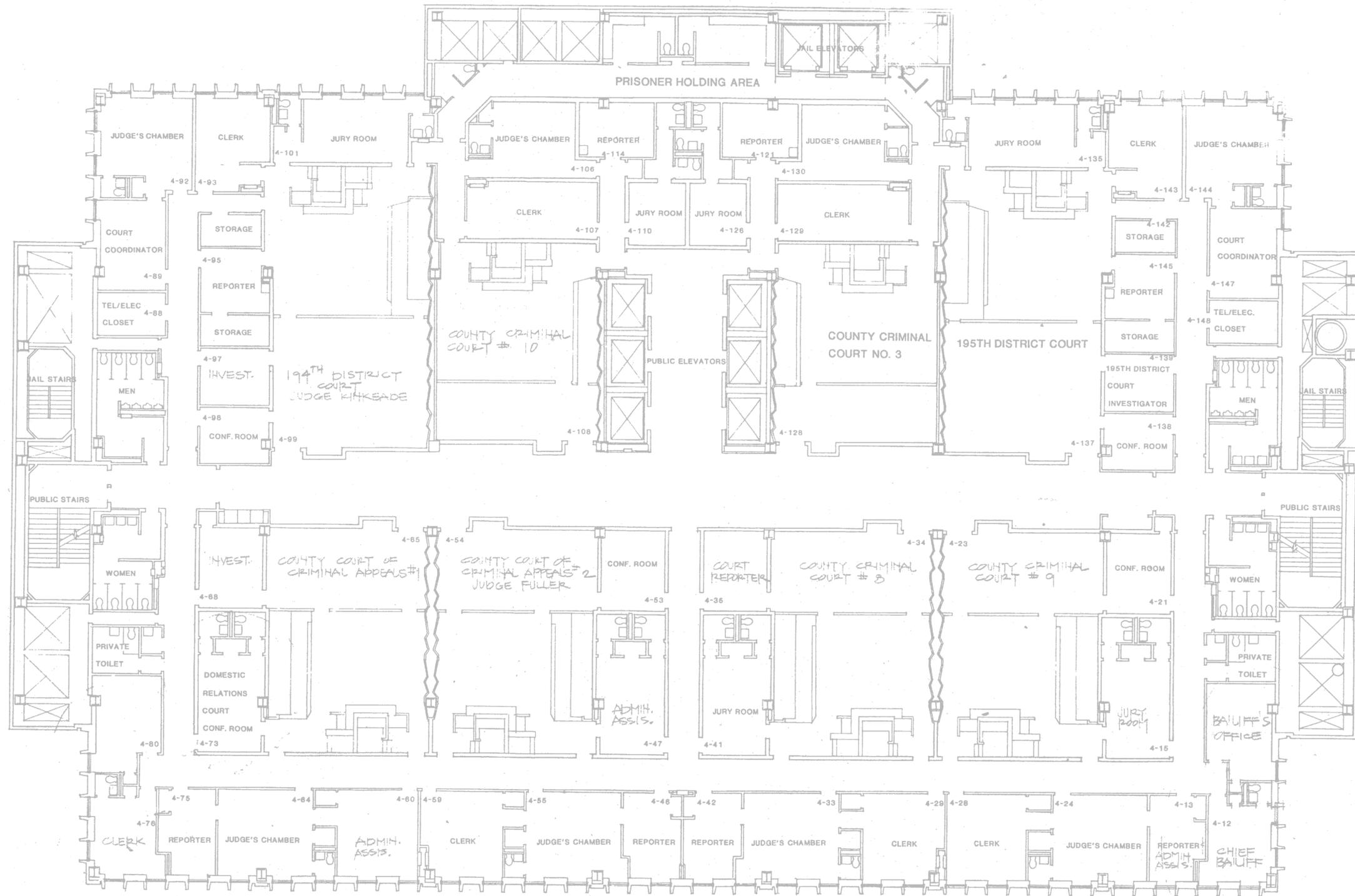
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145803
LICENSED PROFESSIONAL ENGINEER
06/12/2025
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3	06/12/2025	ADDENDUM 3	
	08/09/2024	ISSUED FOR BIDDING	

PROJECT NO: 27-001211.01
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SHEET TITLE:
SECOND FLOOR PLAN

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1 FOURTH FLOOR PLAN

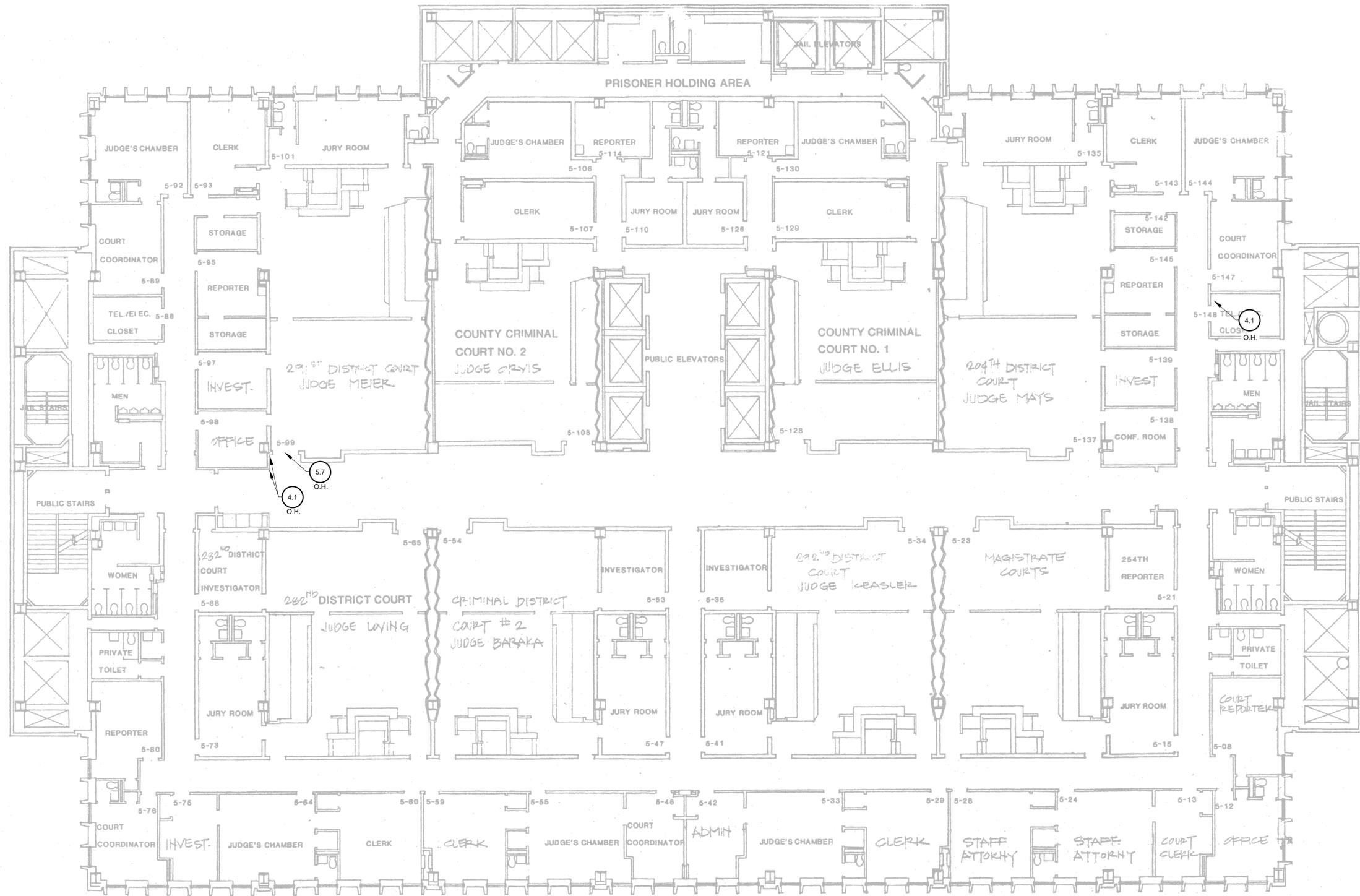
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SHEET TITLE:
FOURTH FLOOR PLAN



1 FIFTH FLOOR PLAN

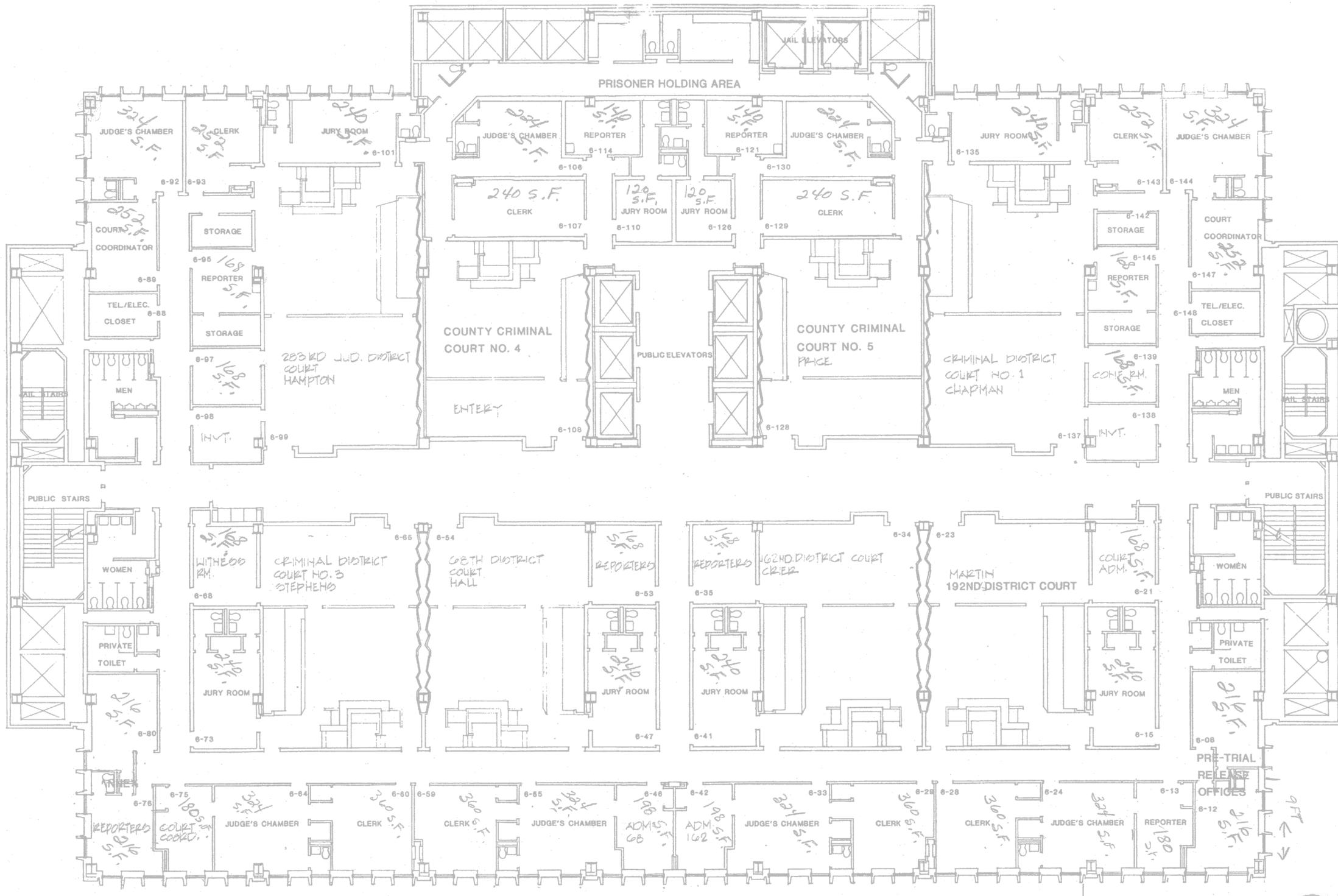


**GEORGE ALLEN COURTHOUSE
 BUILDING REPAIRS**

DALLAS TEXAS

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	08/09/2024	ISSUED FOR BIDDING	

PROJECT NO:	27-001211.01
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CHECKED BY:	ASG
SHEET TITLE:	FIFTH FLOOR PLAN



1 SIXTH FLOOR PLAN

**GEORGE ALLEN COURTHOUSE
BUILDING REPAIRS**

TEXAS
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	08/09/2024	ISSUED FOR BIDDING	

PROJECT NO:	27-001211.01
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SHEET TITLE:	SIXTH FLOOR PLAN

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1 SEVENTH FLOOR PLAN

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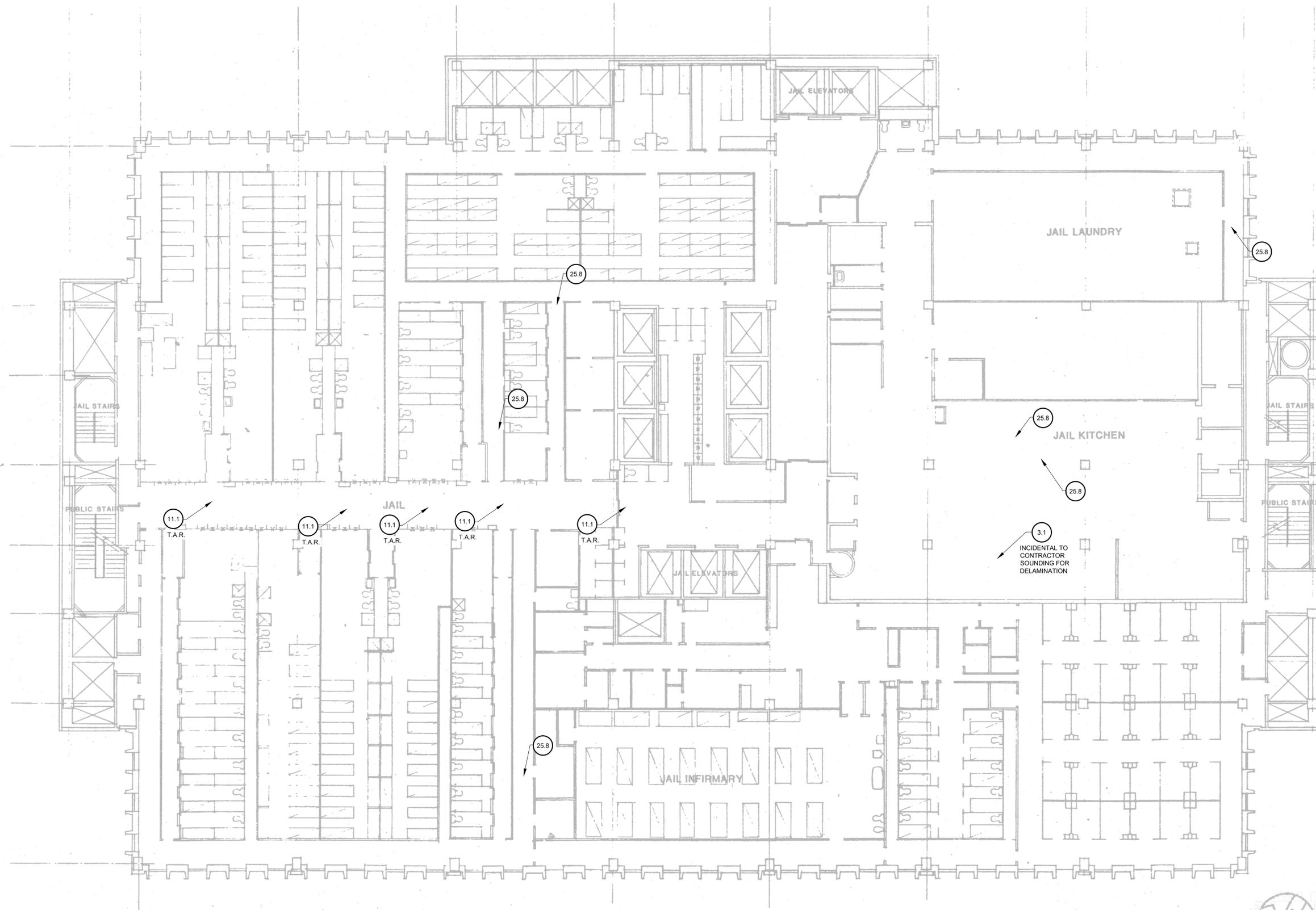
GEORGE ALLEN COURTHOUSE
BUILDING REPAIRS

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SHEET TITLE:
SEVENTH FLOOR PLAN

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1 EIGHTH FLOOR PLAN

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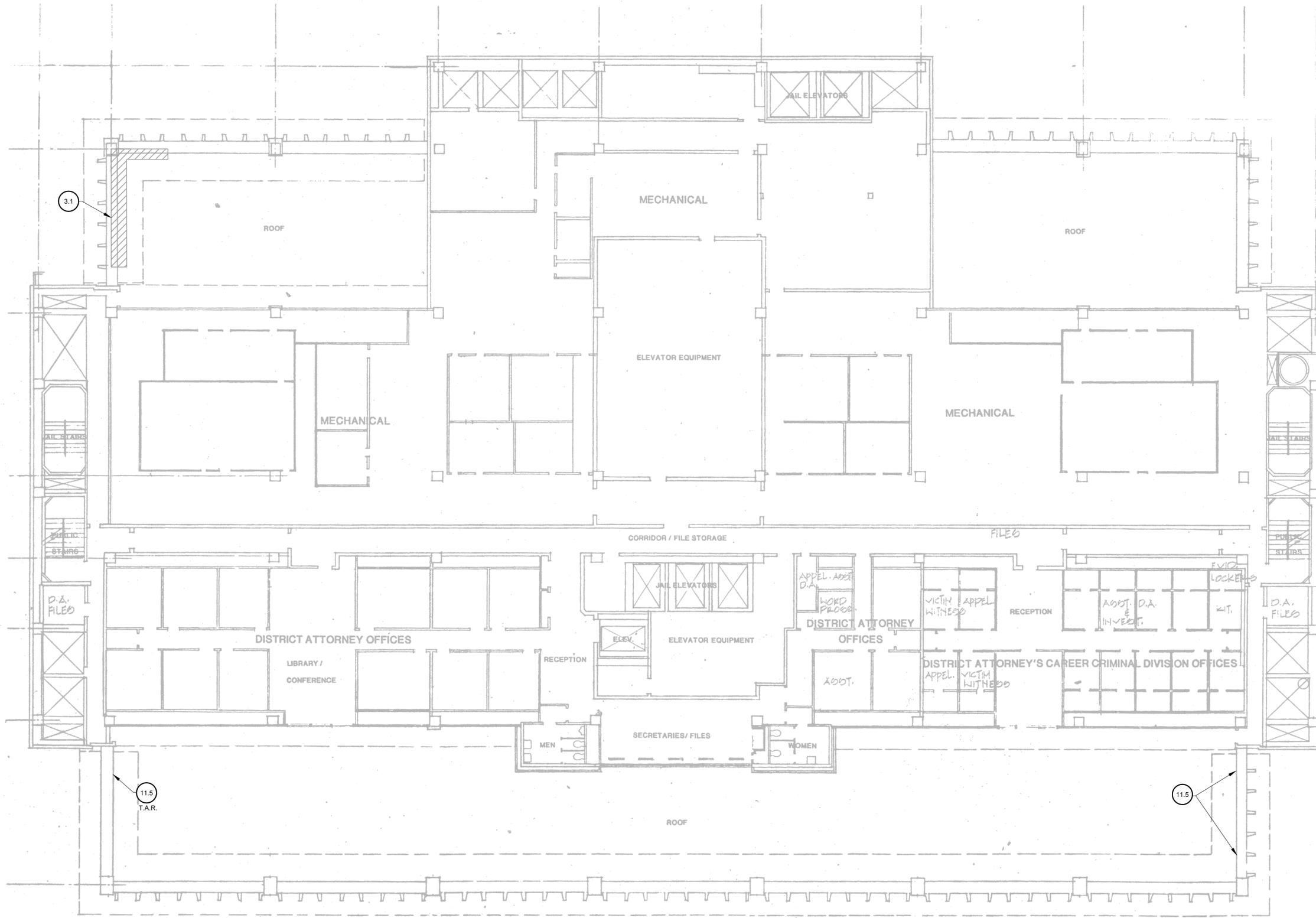
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PROJECT NO: 27-001211.01
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 EIGHTH FLOOR PLAN

R-109



1 NINTH FLOOR PLAN

**GEORGE ALLEN COURTHOUSE
 BUILDING REPAIRS**

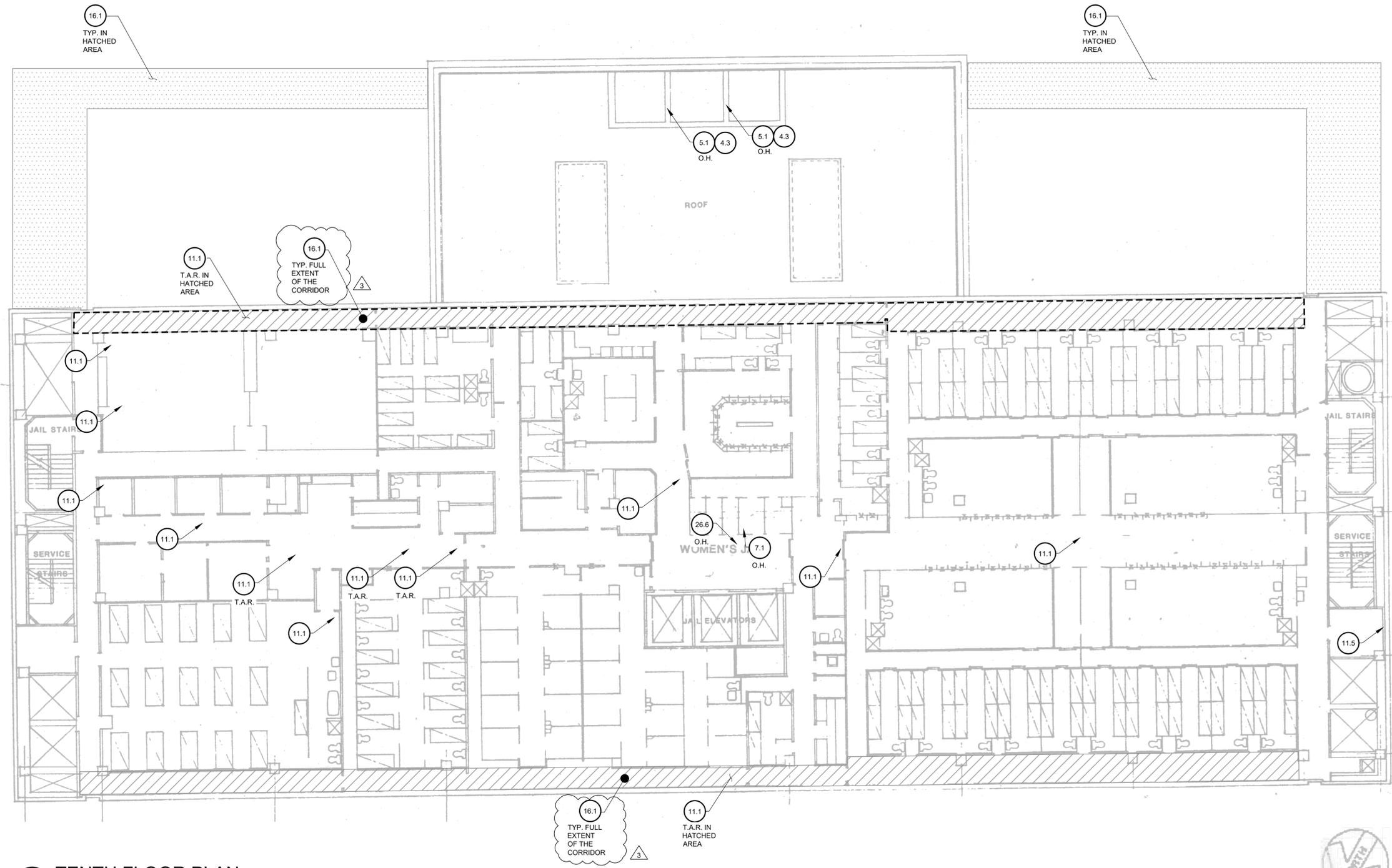
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PROJECT NO:	27-001211.01
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SHEET TITLE:	NINTH FLOOR PLAN

R-110

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1 TENTH FLOOR PLAN

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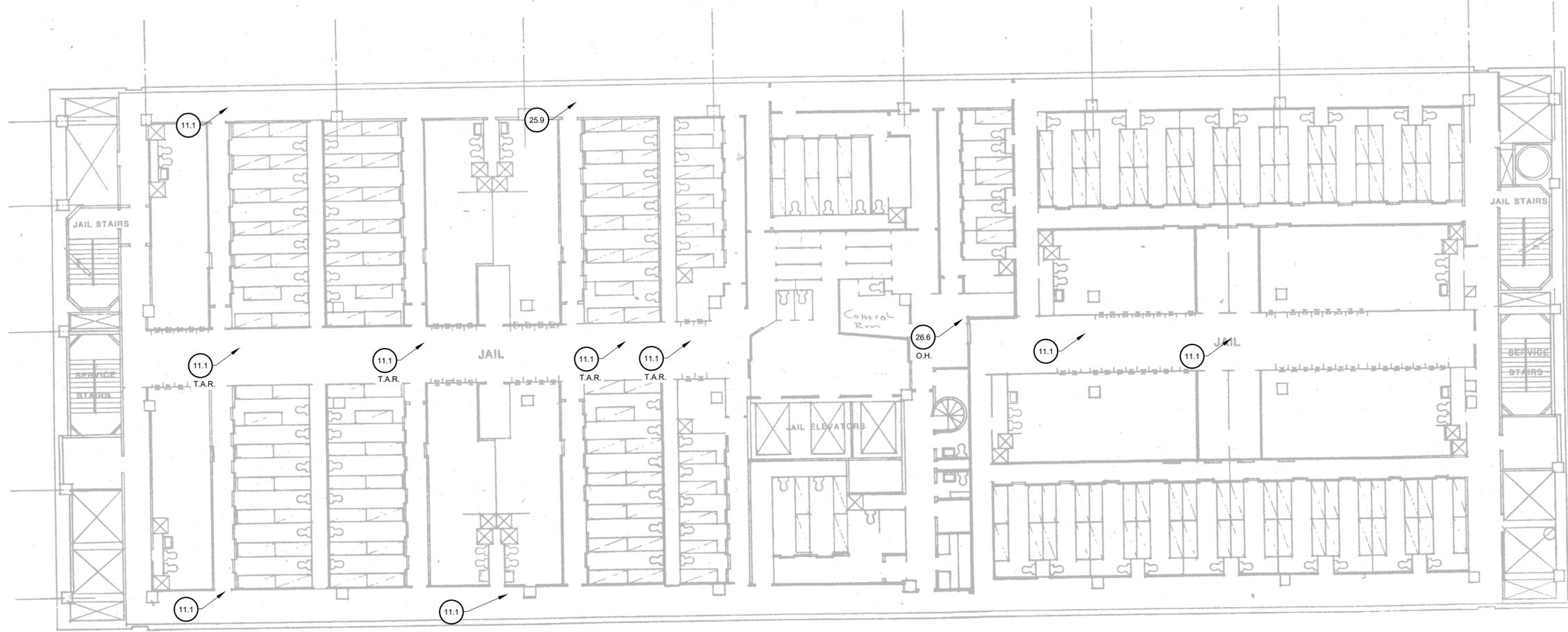
**GEORGE ALLEN COURTHOUSE
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PROJECT NO: 27-001211.01
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 SHEET TITLE:
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R-111

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1 ELEVENTH FLOOR PLAN

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**GEORGE ALLEN COURTHOUSE
BUILDING REPAIRS**

TEXAS

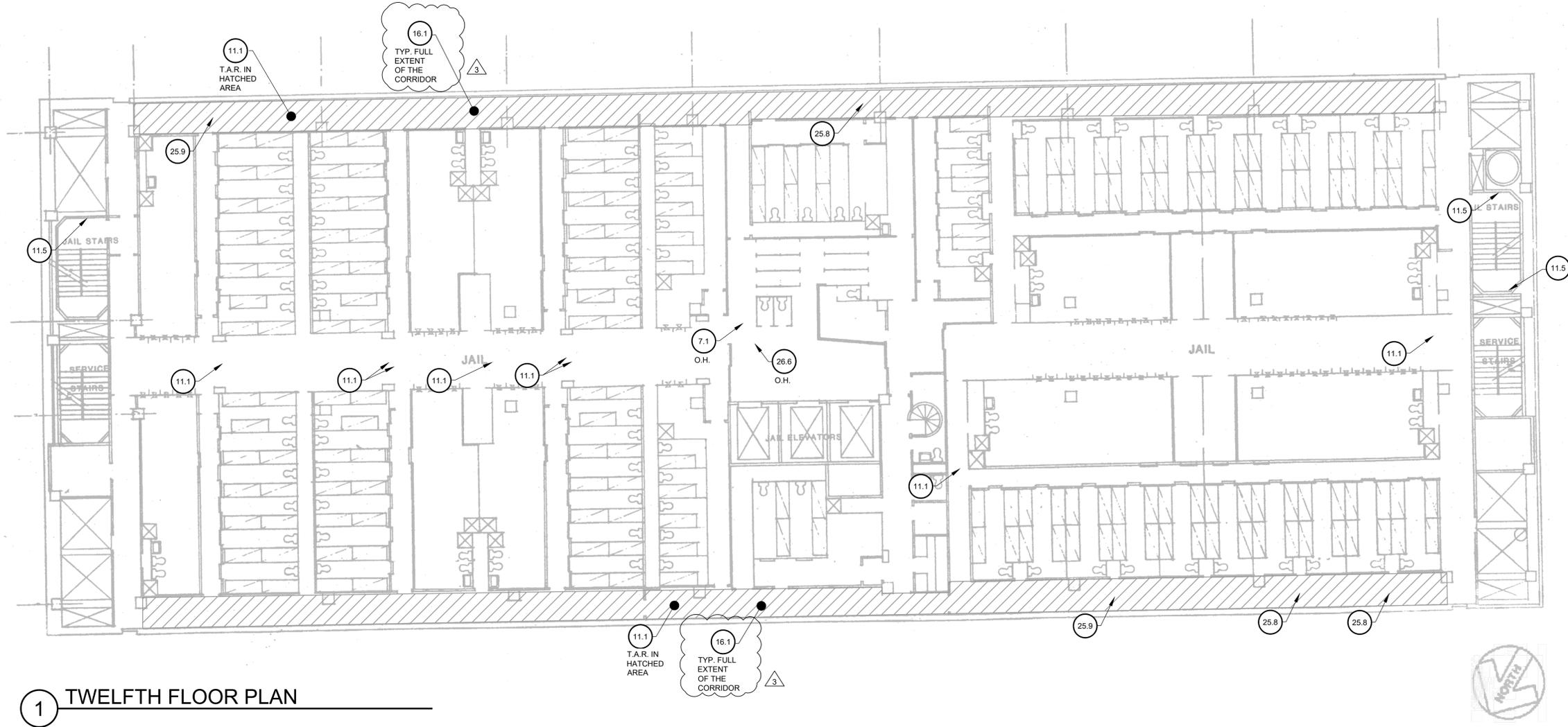
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PROJECT NO: 27-001211.01
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SHEET TITLE:
ELEVENTH FLOOR PLAN

R-112

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1 TWELFTH FLOOR PLAN



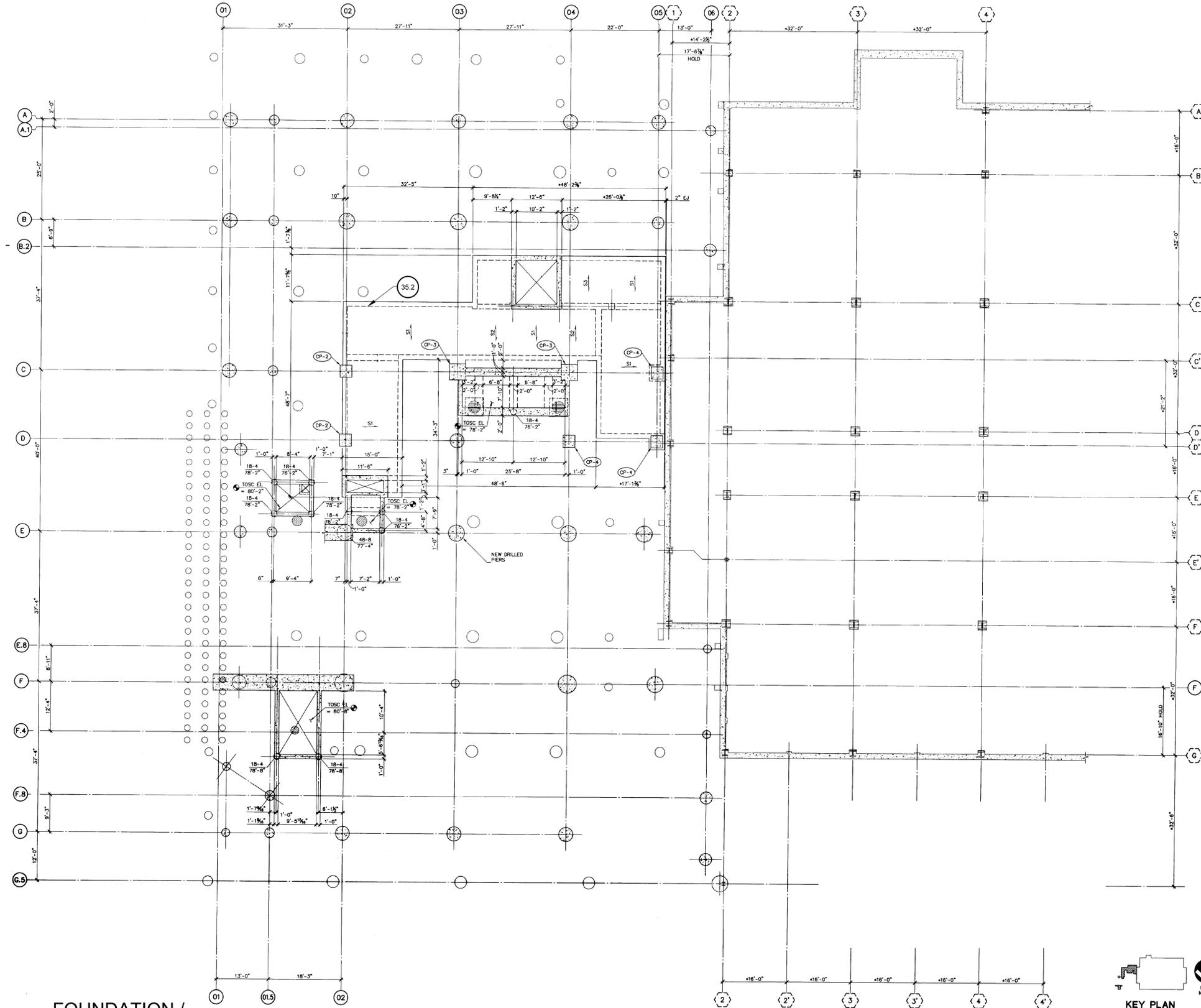
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**GEORGE ALLEN COURTHOUSE
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PROJECT NO: 27-001211.01
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 TWELFTH FLOOR PLAN



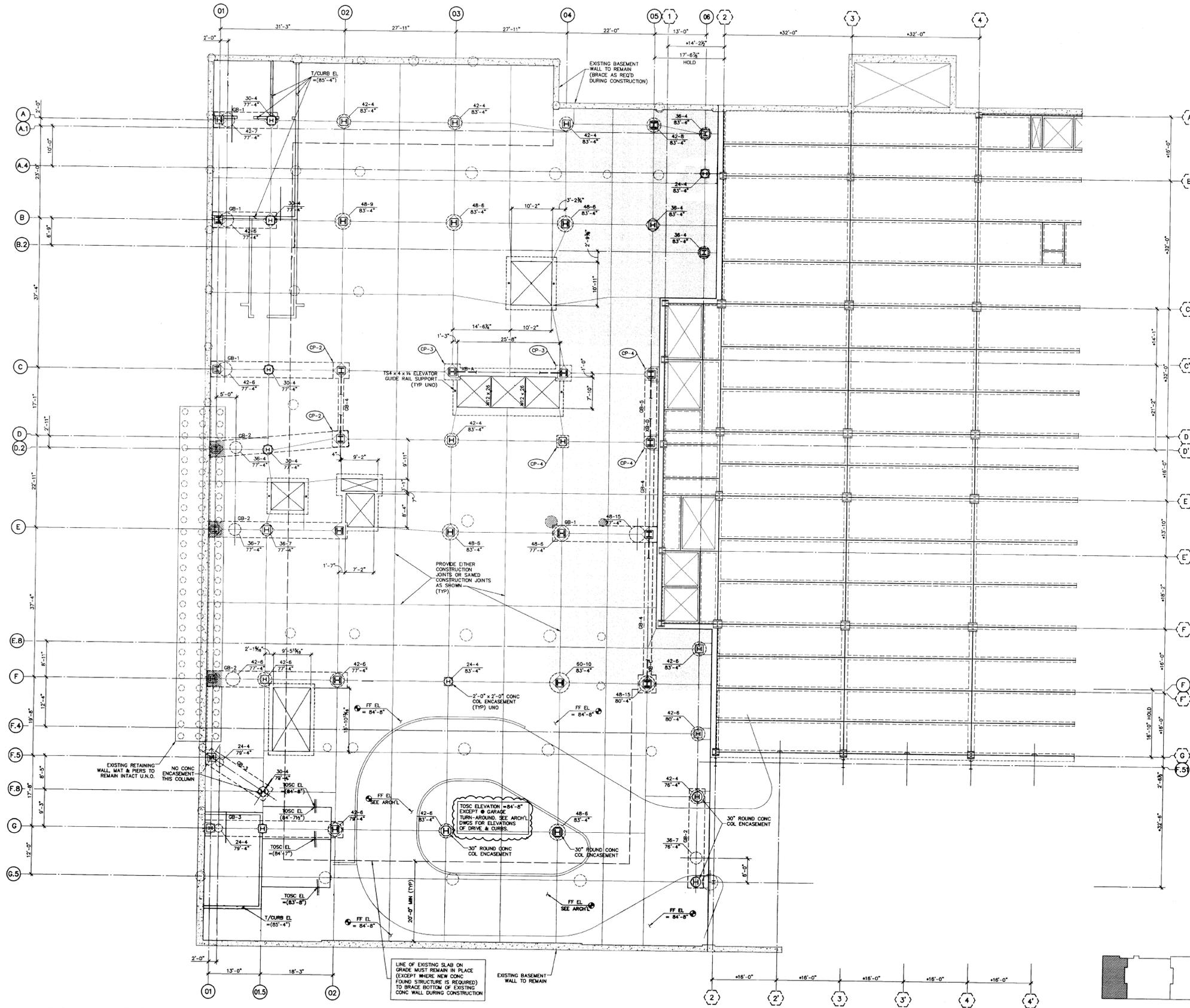
1 FOUNDATION / SUB-BASEMENT ROOF FRAMING PLAN

GEORGE ALLEN COURTHOUSE
 BUILDING REPAIRS
 DALLAS
 TEXAS

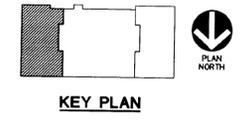
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 FOUNDATION / SUB-BASEMENT ROOF FRAMING PLAN

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1 FOUNDATION / GROUND FLOOR FRAMING PLAN



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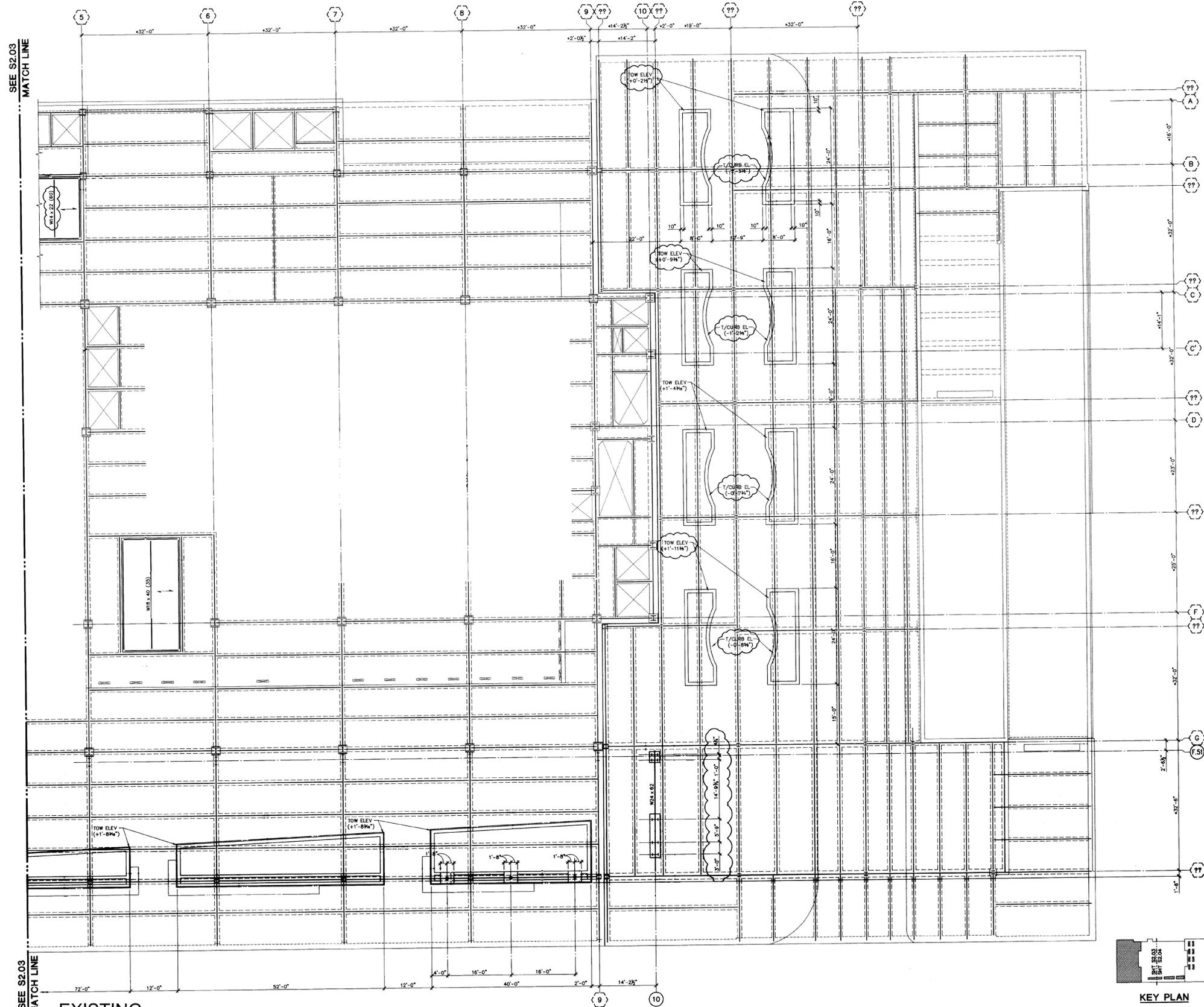
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GEORGE ALLEN COURTHOUSE
BUILDING REPAIRS
DALLAS

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3	08/12/2025	ADDENDUM 3	
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			08/09/2024

PROJECT NO: 27-001211.01
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FOUNDATION / GROUND FLOOR FRAMING PLAN

R-115

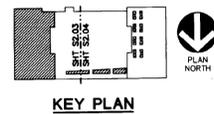
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SEE S2.03
MATCH LINE

SEE S2.03
MATCH LINE

**EXISTING
PLAZA FLOOR FRAMING PLAN**



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BUILDING REPAIRS**

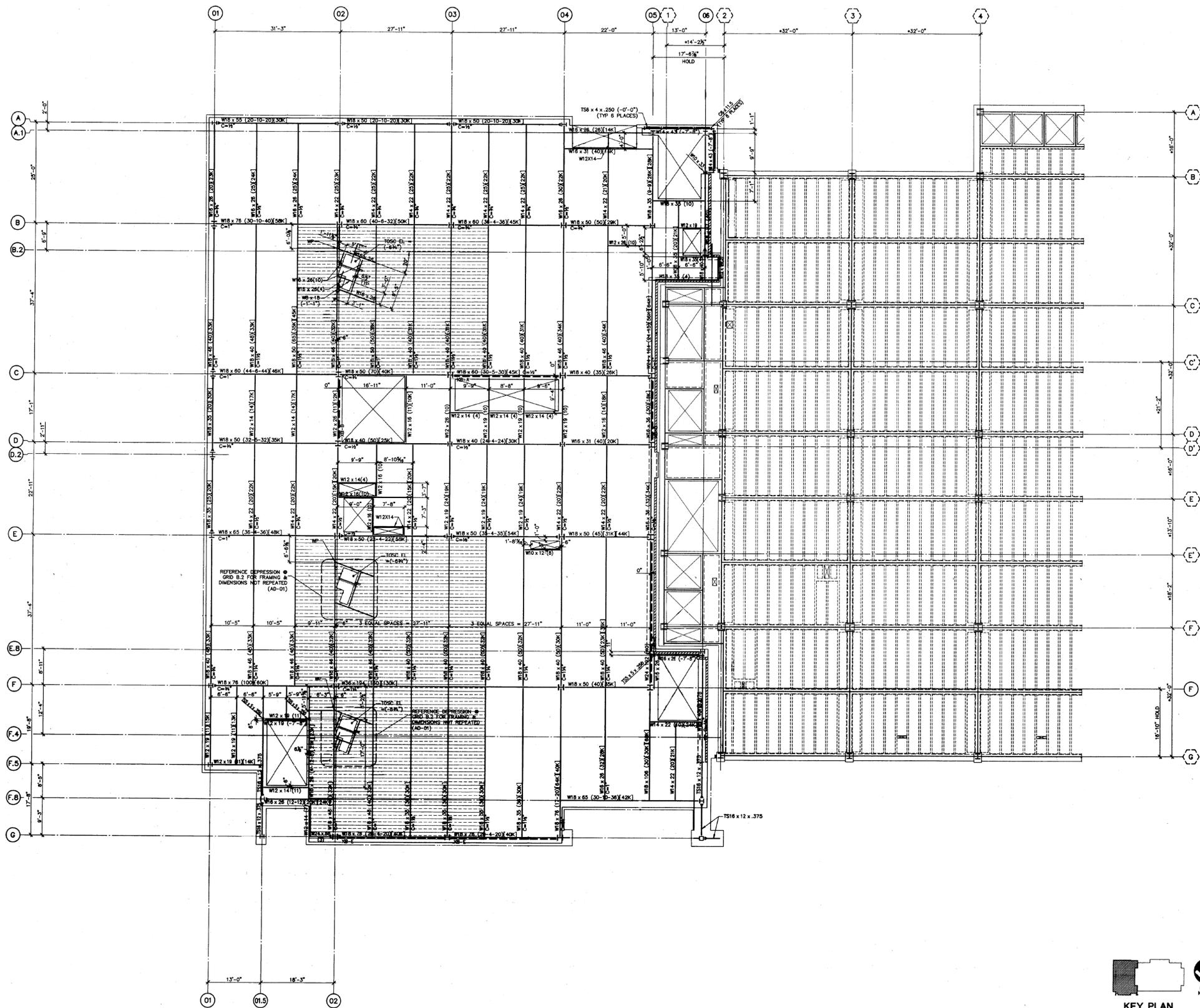
TEXAS

DALLAS

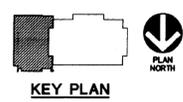
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 SHEET TITLE:
 EXISTING PLAZA
 FLOOR FRAMING
 PLAN

R-117



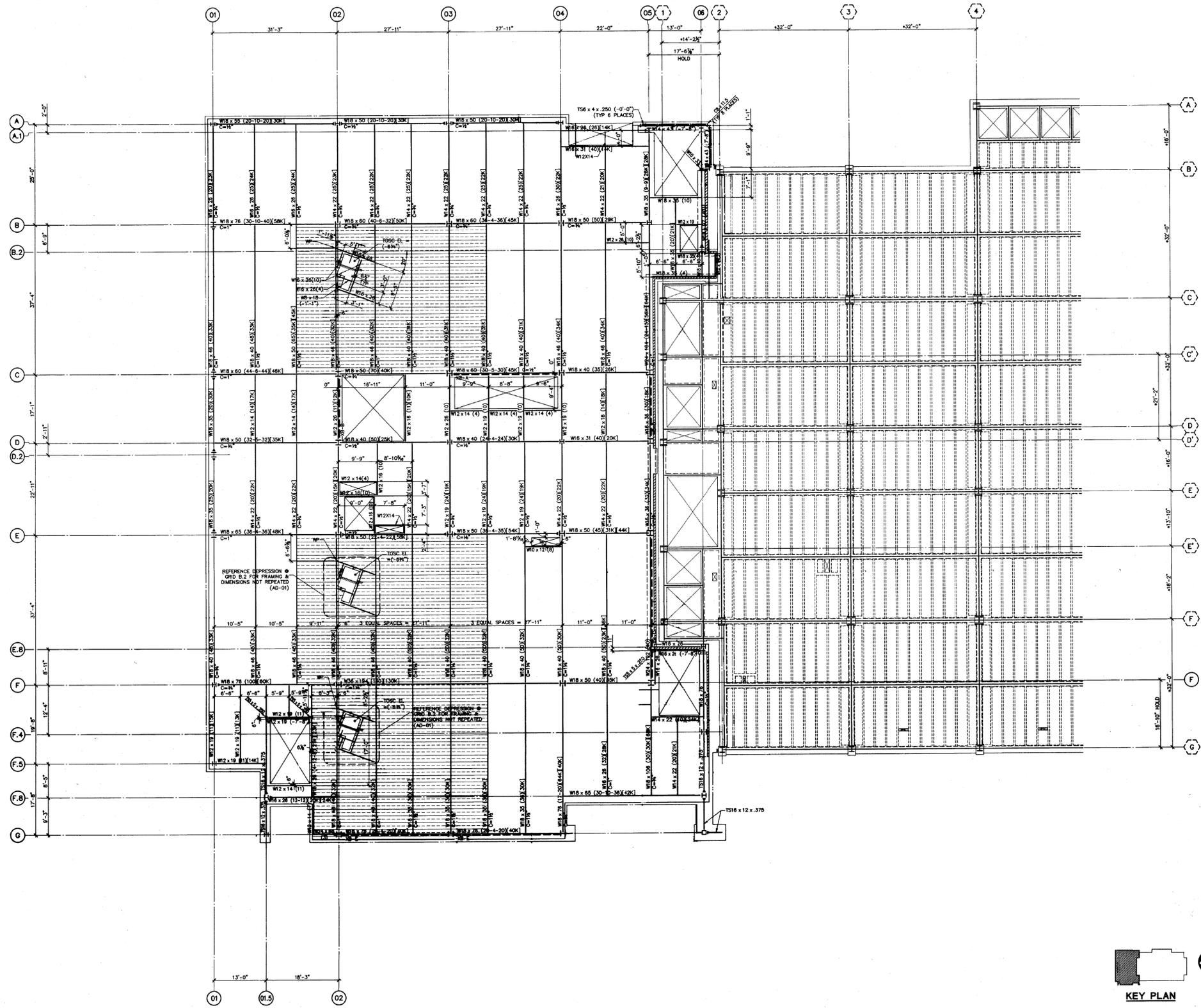
1 FIFTH FLOOR FRAMING PLAN



GEORGE ALLEN COURTHOUSE
 BUILDING REPAIRS
 DALLAS, TEXAS

MARK	DATE	DESCRIPTION	ISSUED
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 FRAMING PLAN



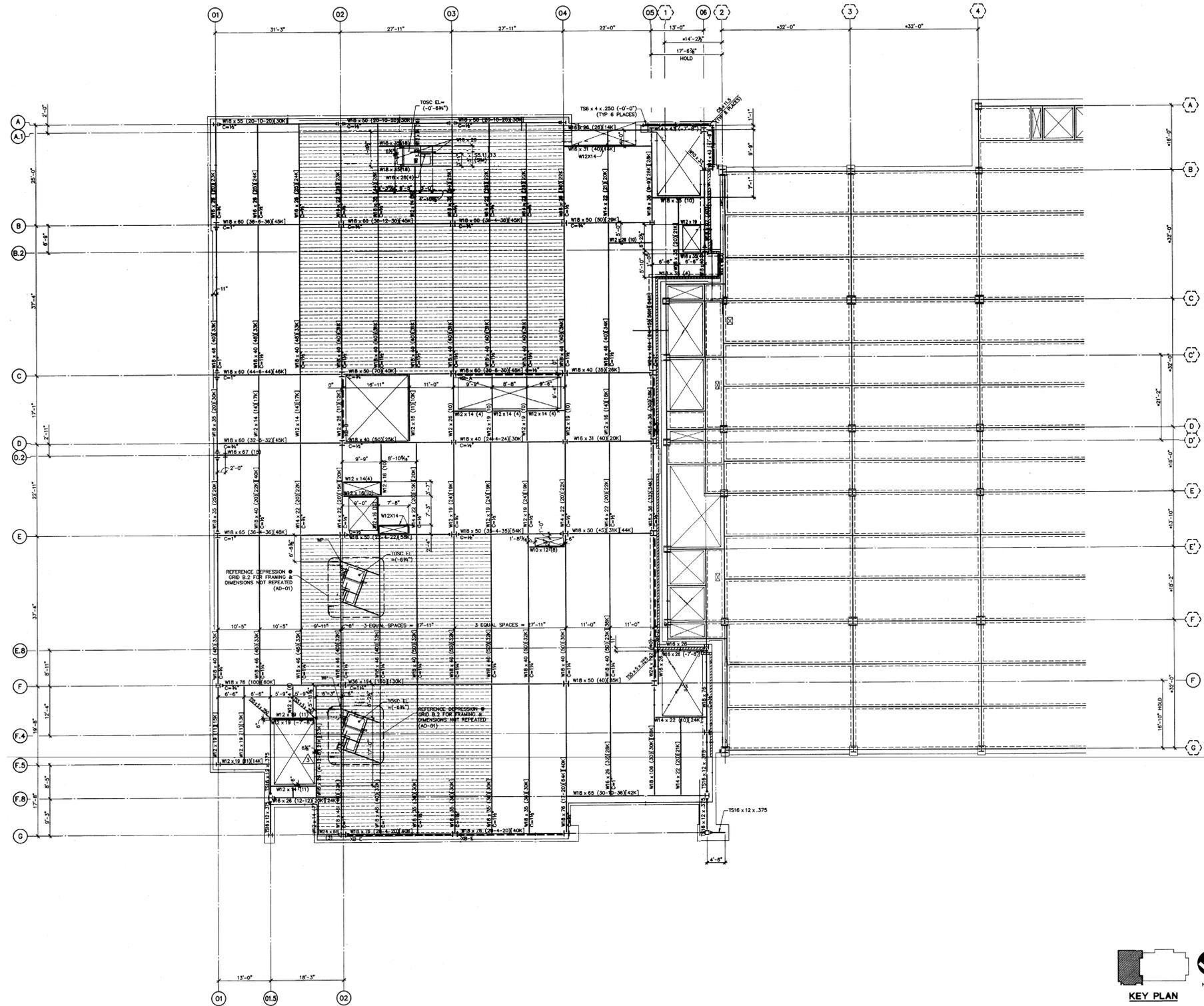
1 SIXTH FLOOR FRAMING PLAN



TEXAS
 GEORGE ALLEN COURTHOUSE
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 SIXTH FLOOR
 FRAMING PLAN

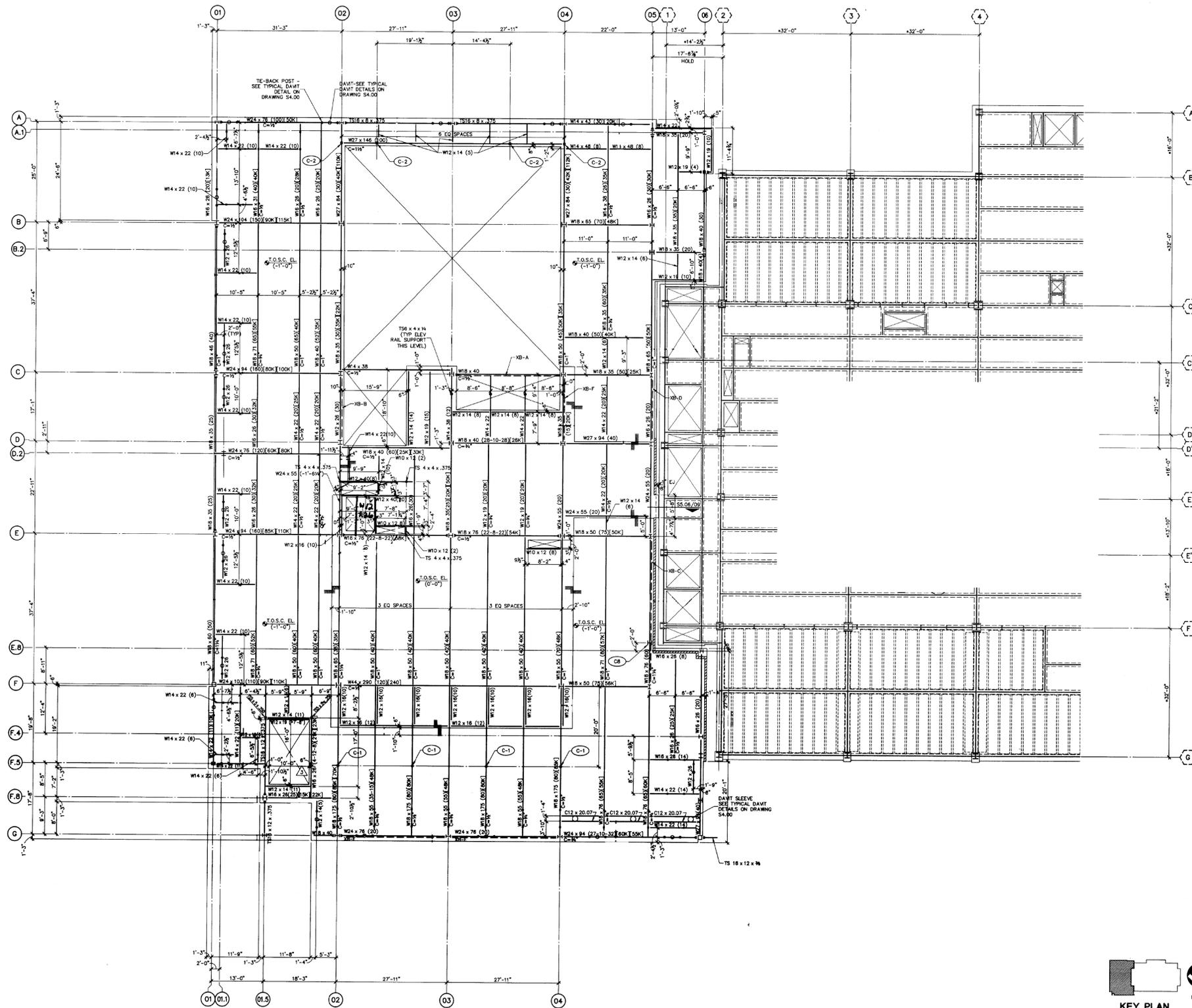


1 EIGHTH FLOOR FRAMING PLAN

**GEORGE ALLEN COURTHOUSE
 BUILDING REPAIRS**
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MARK	DATE	DESCRIPTION	ISSUED:
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 EIGHTH FLOOR
 FRAMING PLAN



1 NINTH FLOOR FRAMING PLAN

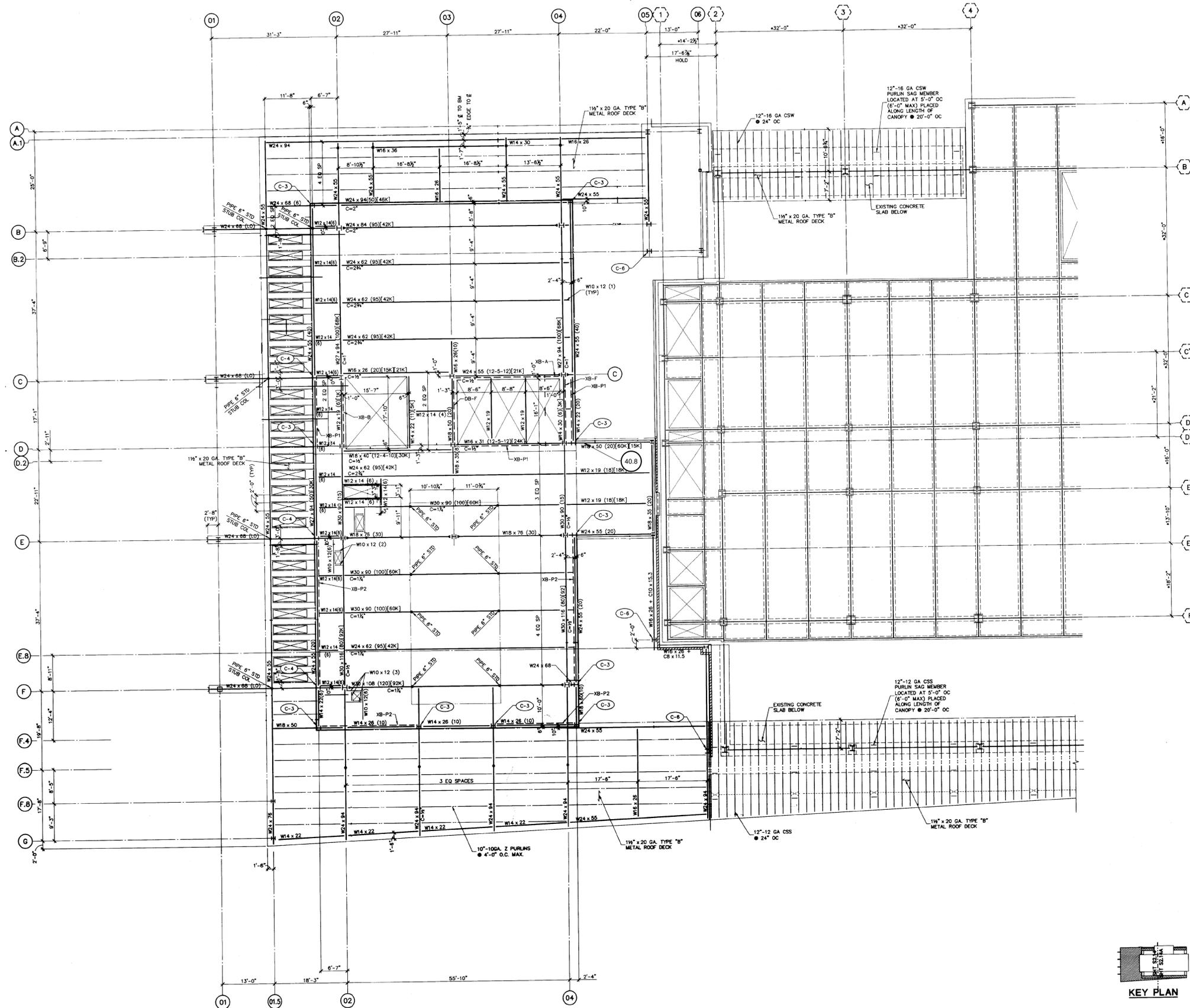
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DALLAS TEXAS

MARK	DATE	DESCRIPTION	ISSUED:
3	06/12/2025	ADDENDUM 3	
	08/09/2024	ISSUED FOR BIDDING	

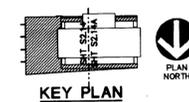
PROJECT NO:	27-001211.01
DRAWN BY:	CC
CHECKED BY:	ASG

SHEET TITLE:
NINTH FLOOR
FRAMING PLAN

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1 MECHANICAL SUB-FLOOR / HIGH CANOPY FRAMING PLAN



GEORGE ALLEN COURTHOUSE
BUILDING REPAIRS

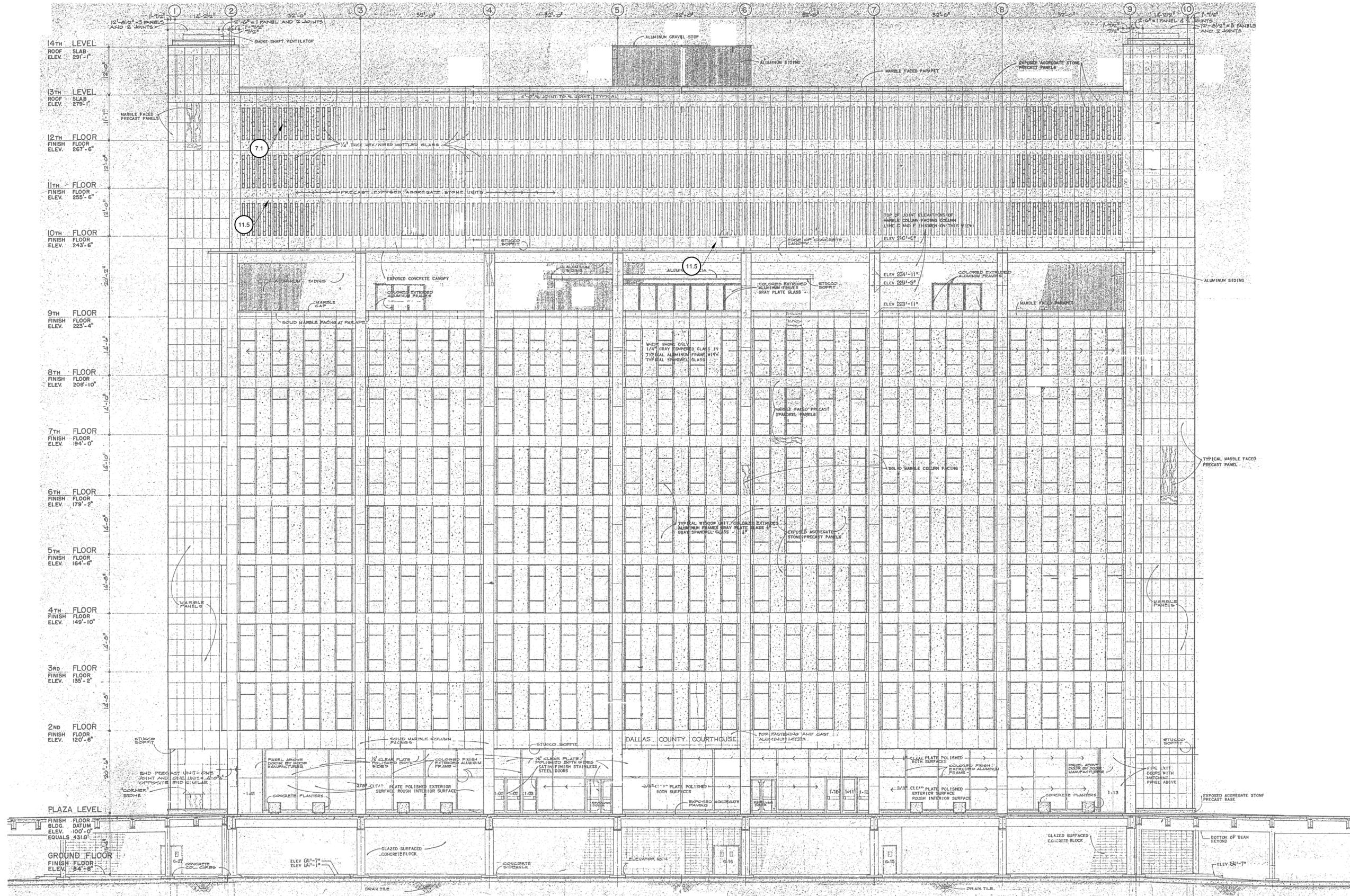
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MARK	DATE	DESCRIPTION	ISSUED
3	08/12/2025	ADDENDUM 3	
	08/09/2024	ISSUED FOR BIDDING	

PROJECT NO:	27-001211.01
DRAWN BY:	CC
CHECKED BY:	ASG
SHEET TITLE:	MECHANICAL SUB-FLOOR / HIGH CANOPY FRAMING PLAN

R-126



1 COMMERCE STREET ELEVATION

SHEET NOTES:
 1. THE DISTRESSED FACADE CONDITIONS MARKED FOR REPAIRS IN THESE DOCUMENTS WERE OBSERVED AS PART OF A LIMITED STRUCTURAL ASSESSMENT. WALKER SCOPE DID NOT INCLUDE AND WALKER DID NOT PERFORM A FACADE OR BUILDING ENVELOPE ASSESSMENT. THESE OCCURRENCES SHOULD BE CONSIDERED AS A PARTIAL ACCOUNTING OF POTENTIAL FACADE DISTRESS CONDITIONS THAT POSE A SAFETY HAZARD. WALKER RECOMMENDS A FULL FACADE ASSESSMENT BE PERFORMED TO INFORM ADDITIONAL FACADE DAMAGE/REPAIRS.



**GEORGE ALLEN COURTHOUSE
BUILDING REPAIRS**

DALLAS, TEXAS

MARK	DATE	DESCRIPTION	ISSUED
3	06/12/2025	ADDENDUM 3	
2	08/09/2024	ISSUED FOR BIDDING	
			08/09/2024

PROJECT NO: 27-001211.01
 DRAWN BY: CC
 CHECKED BY: ASG
 SHEET TITLE: COMMERCE STREET ELEVATION

**GEORGE ALLEN COURTHOUSE
BUILDING REPAIRS**

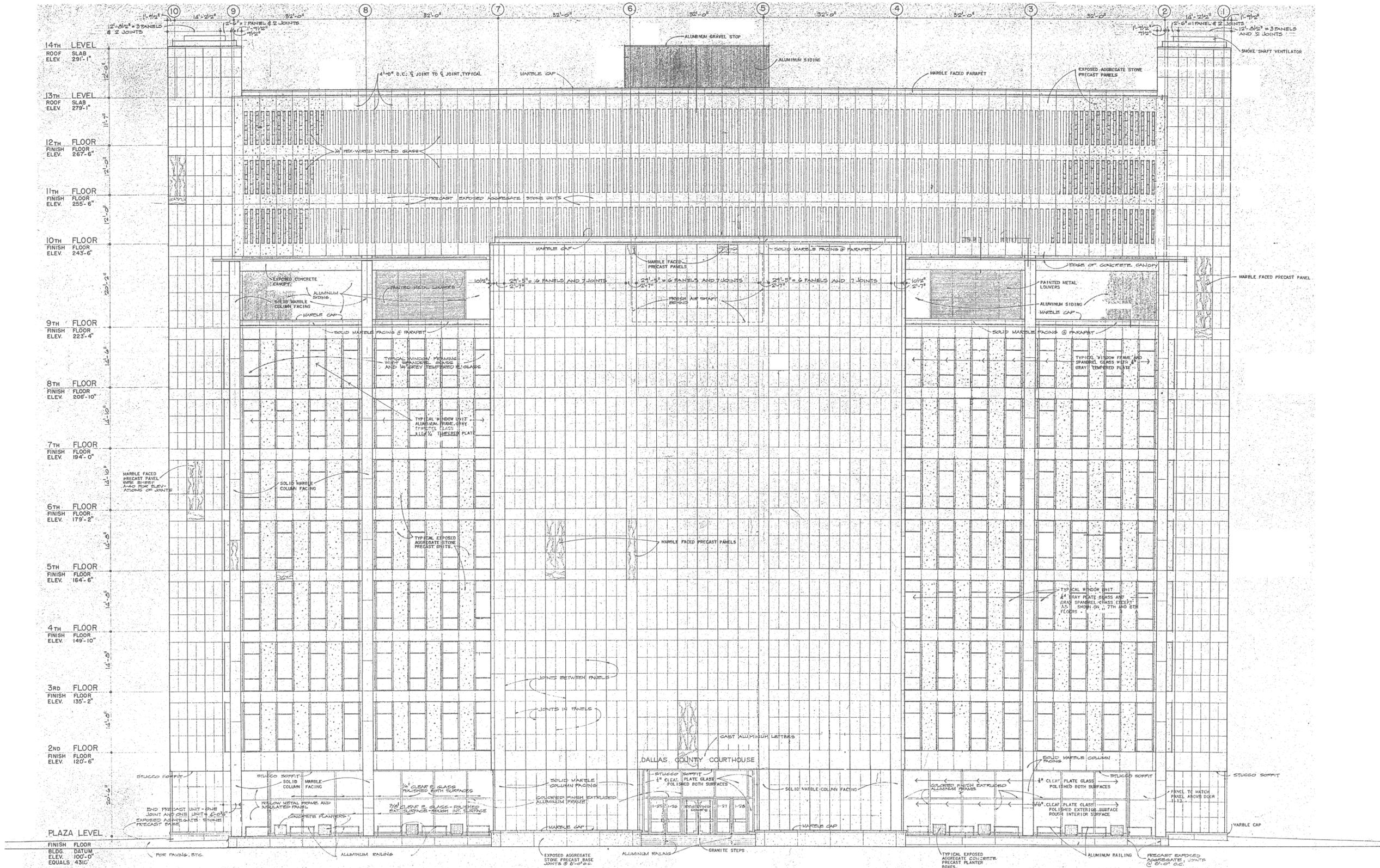
MARK	DATE	DESCRIPTION	ISSUED
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2	08/09/2024	ISSUED FOR BIDDING	

PROJECT NO: 27-001211.01

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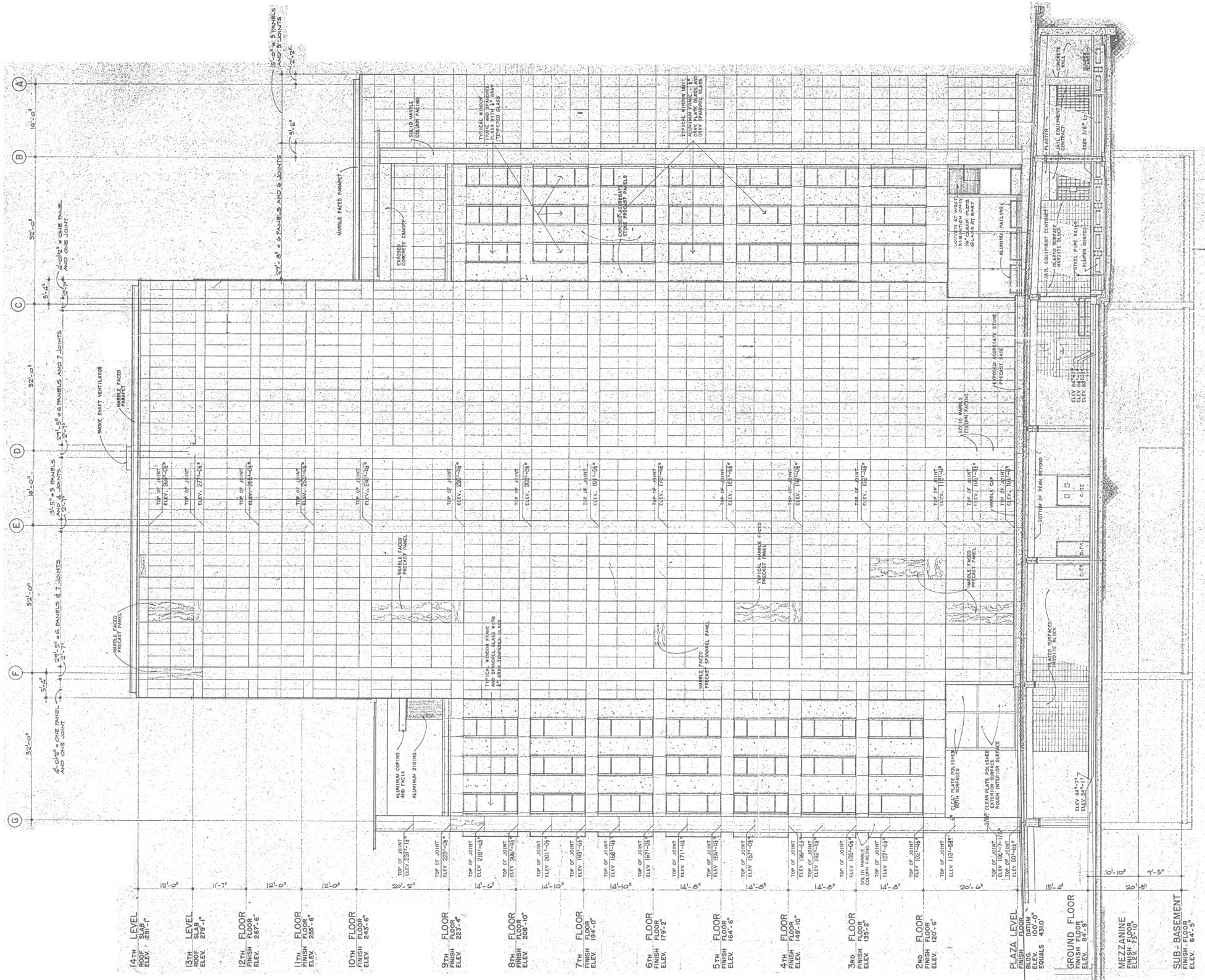
SHEET TITLE:
JACKSON STREET ELEVATION



1 JACKSON STREET ELEVATION

SHEET NOTES:

1. THE DISTRESSED FACADE CONDITIONS MARKED FOR REPAIRS IN THESE DOCUMENTS WERE OBSERVED AS PART OF A LIMITED STRUCTURAL ASSESSMENT. WALKER SCOPE DID NOT INCLUDE AND WALKER DID NOT PERFORM A FACADE OR BUILDING ENVELOPE ASSESSMENT. THESE OCCURRENCES SHOULD BE CONSIDERED AS A PARTIAL ACCOUNTING OF POTENTIAL FACADE DISTRESS CONDITIONS THAT POSE A SAFETY HAZARD. WALKER RECOMMENDS A FULL FACADE ASSESSMENT BE PERFORMED TO INFORM ADDITIONAL FACADE DAMAGE/REPAIRS.



1 HOUSTON STREET ELEVATION

SHEET NOTES:

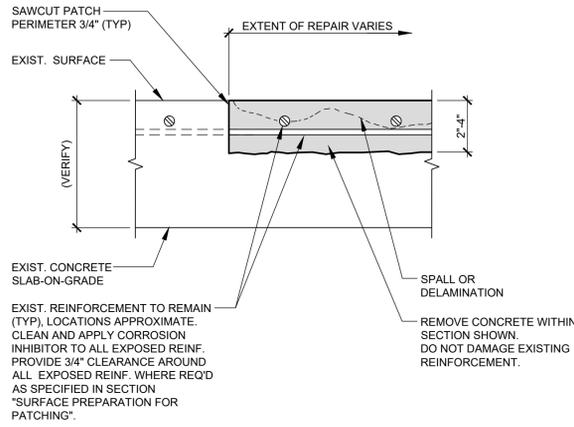
1. THE DISTRESSED FACADE CONDITIONS MARKED FOR REPAIRS IN THESE DOCUMENTS WERE OBSERVED AS PART OF A LIMITED STRUCTURAL ASSESSMENT. WALKER SCOPE DID NOT INCLUDE AND WALKER DID NOT PERFORM A FACADE OR BUILDING ENVELOPE ASSESSMENT. THESE OCCURRENCES SHOULD BE CONSIDERED AS A PARTIAL ACCOUNTING OF POTENTIAL FACADE DISTRESS CONDITIONS THAT POSE A SAFETY HAZARD. WALKER RECOMMENDS A FULL FACADE ASSESSMENT BE PERFORMED TO INFORM ADDITIONAL FACADE DAMAGE/REPAIRS.



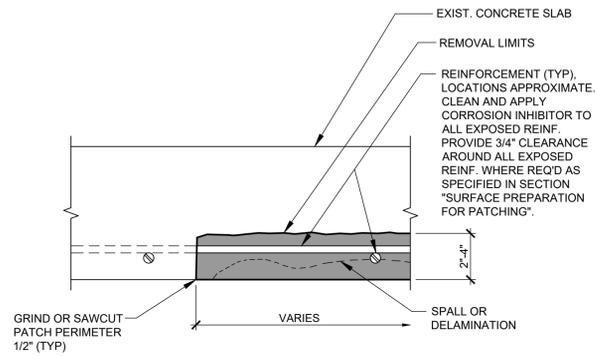
GEORGE ALLEN COURTHOUSE
BUILDING REPAIRS

PROJECT NO:	27-001211.01		
DRAWN BY:	CC		
CHECKED BY:	ASG		
SHEET TITLE:	HOUSTON STREET ELEVATION		
MARK	DATE	DESCRIPTION	ISSUED
3	06/12/2025	ADDENDUM 3	
	08/09/2024	ISSUED FOR BIDDING	

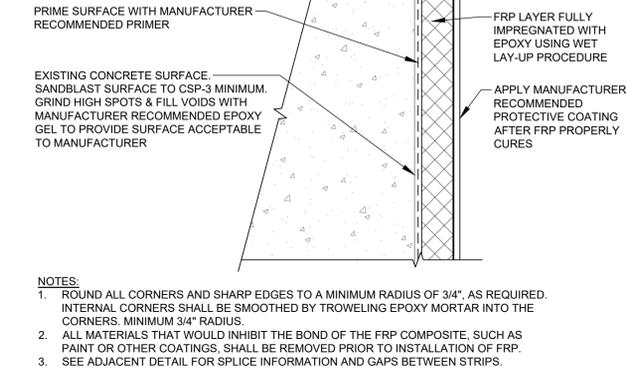
DALLAS TEXAS
R-202



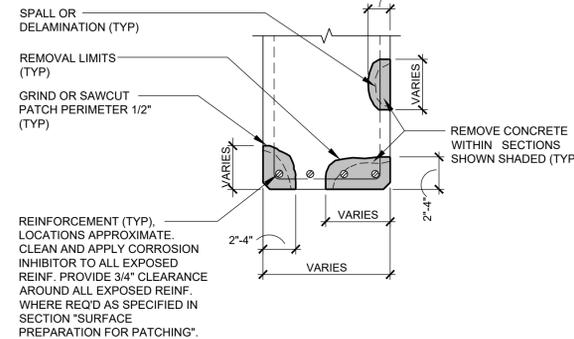
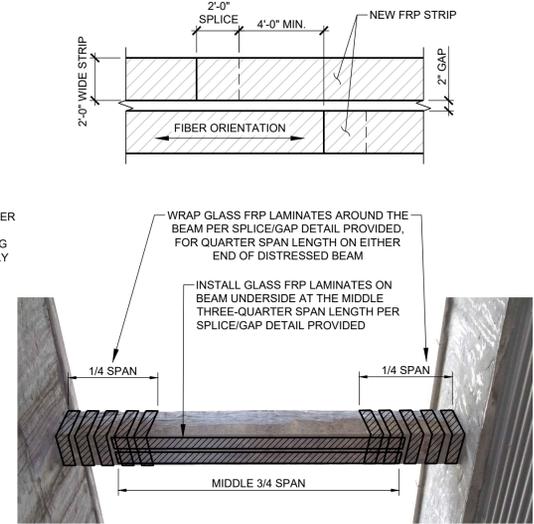
3.1 FLOOR REPAIR - PARTIAL DEPTH



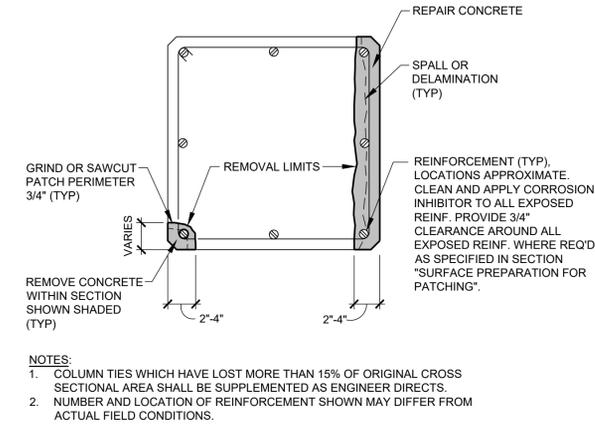
4.1 CEILING REPAIR-PARTIAL DEPTH



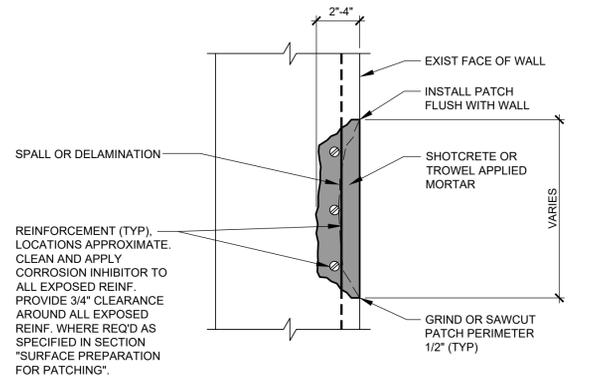
4.3 GLASS FRP MOUNT AND SPLICE/GAP



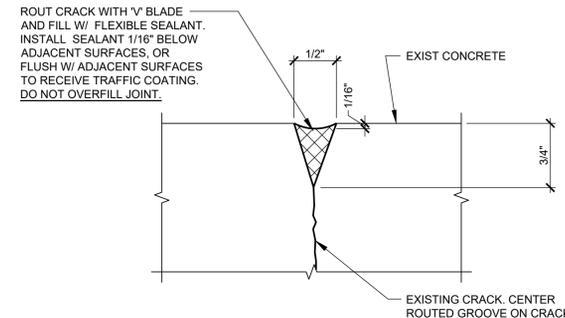
5.1 BEAM REPAIR-PARTIAL DEPTH



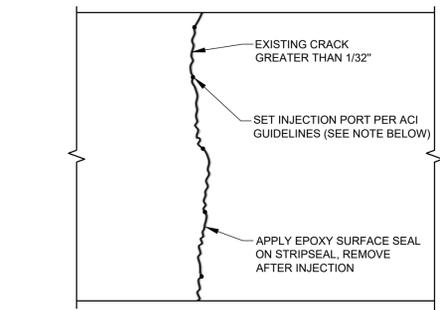
6.1 COLUMN REPAIR-PARTIAL DEPTH



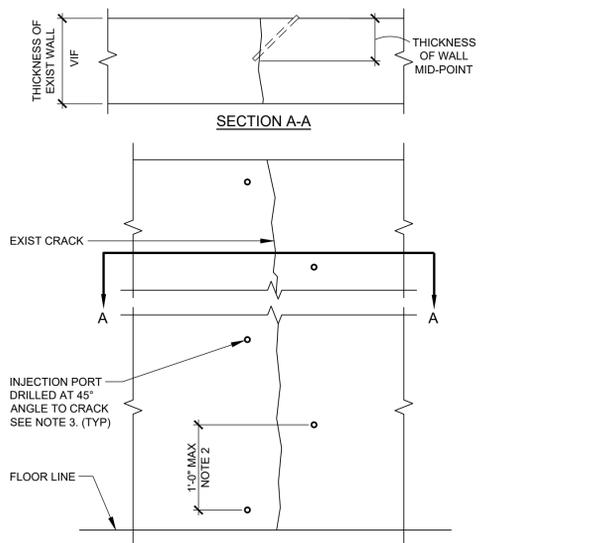
7.1 WALL REPAIR-PARTIAL DEPTH



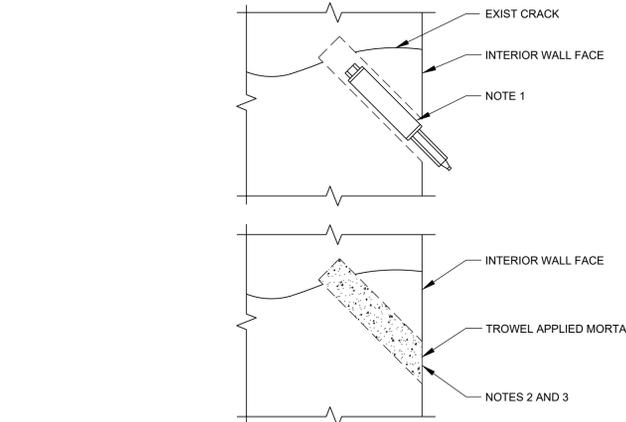
11.1 ROUT & SEAL CRACKS (CRACKS 0.030\"/>



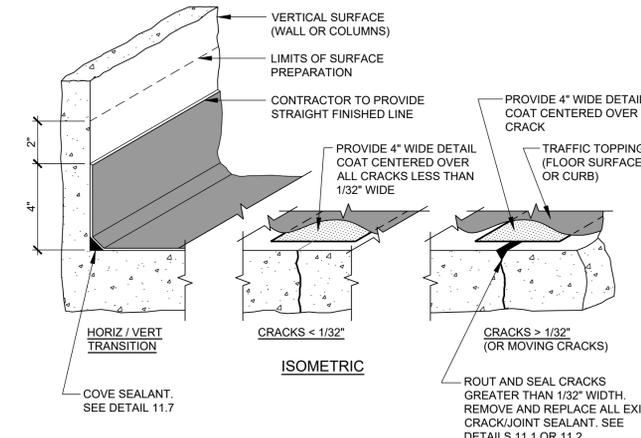
11.5 CRACK REPAIR EPOXY INJECTION



11.6 CHEMICAL GROUT INJECTION



11.6.1 CHEMICAL GROUT INJECTION



11.6.1 TRAFFIC TOPPING-VEHICULAR/RECOAT

MARK	DATE	DESCRIPTION	ISSUED
3	06/12/2025	ADDENDUM 3	
4	08/09/2024	ISSUED FOR BIDDING	

PROJECT NO:	27-001211.01
DRAWN BY:	CC
CHECKED BY:	ASG
SHEET TITLE:	REPAIR DETAILS

PROJECT NO:	27-001211.01		
DRAWN BY:	CC		
CHECKED BY:	ASG		
SHEET TITLE:	REPAIR DETAILS		
MARK	DATE	DESCRIPTION	ISSUED
3	06/12/2025	ADDENDUM 3	
	08/09/2024	ISSUED FOR BIDDING	

PROJECT NO: 27-001211.01
 DRAWN BY: CC
 CHECKED BY: ASG
 SHEET TITLE: REPAIR DETAILS

R-501



25.8 REPLACE BROKEN DRAIN GRATING



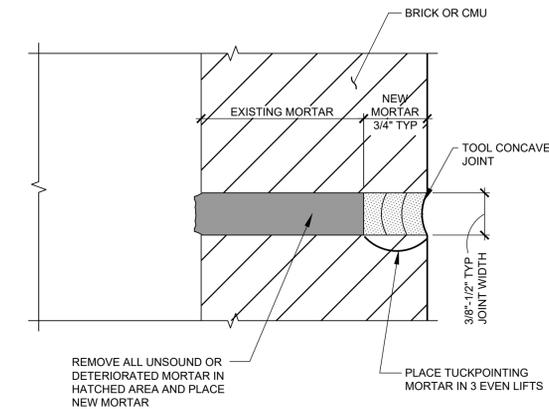
25.9 FLOOR REPAIR AT FLOOR DRAIN
 REFER TO DETAIL 3.1



26.6 REPLACE DAMAGED FIREPROOFING

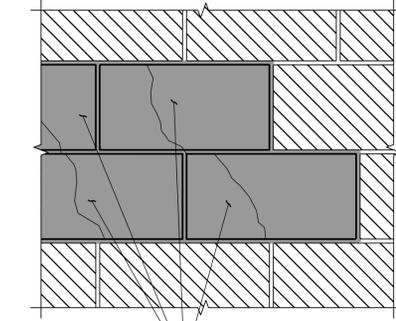


26.7 REMOVE EXIST. FIREPROOFING, REMOVE CORROSION, PAINT WITH CORROSION INHIBITIVE COATING, AND REAPPLY FIREPROOFING



35.1 TUCKPOINTING

NOTES:
 1. REMOVE LOOSE MATERIAL FROM JOINT.
 2. FILL ANY VOIDS IN JOINT BEYOND POINTING WORK DEPTH.
 3. GRIND BRICK SURFACES CLEAN OF EXISTING MORTAR. DO NOT DAMAGE ADJACENT MASONRY.
 4. INSTALL MORTAR IN THREE LIFTS, COMPACTING EACH LIFT.
 5. TOOL MORTAR JOINT CONCAVE.

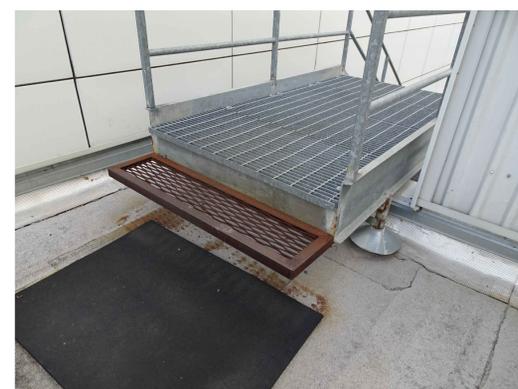


35.2 MASONRY UNIT REPAIR/REPLACEMENT

NOTES:
 1. PAY UNIT INCLUDES PROVIDING CORNER UNITS, BOND BEAM UNITS, ETC. AS REQUIRED TO REPAIR ALL DAMAGED MASONRY.
 2. INCIDENTAL TO THIS WORK IS PROVIDING NEW TRUSS OR LADDER TYPE REINFORCEMENT TO MATCH EXISTING. LAP MINIMUM ONE BLOCK LENGTH.
 3. CONTRACTOR SHALL SUPPORT REMAINING AREAS OF MASONRY DURING REPAIRS.



40.7 REPLACE FASTENERS EXHIBITING CORROSION



40.8 REMOVE RUST AND PAINT STAIR LANDING WITH CORROSION INHIBITOR

NOTES:
 1. CONTRACTOR TO USE SW PRO INDUSTRIAL DTM ACRYLIC CORROSION INHIBITING PAINT U.N.O. MATERIAL SUBMITTAL FOR CORROSION INHIBITIVE COATING TO BE SUBMITTED FOR APPROVAL PRIOR TO PROCUREMENT AND APPLICATION.



45.6 ABRASIVELY BLAST AND RECOAT STRUCTURAL STEEL EXHIBITING CORROSION

NOTES:
 1. CONTRACTOR TO USE SW PRO INDUSTRIAL DTM ACRYLIC CORROSION INHIBITING PAINT U.N.O. MATERIAL SUBMITTAL FOR CORROSION INHIBITIVE COATING TO BE SUBMITTED FOR APPROVAL PRIOR TO PROCUREMENT AND APPLICATION.



WALKER
CONSULTANTS

SPECIFICATIONS
FOR

**Frank Crowley Courthouse
Building Repairs 2024**

Dallas, Texas



03/24/2025

ISSUED FOR BIDDING
March 24, 2025

PROJECT NO. 27-001211.01

ADDENDUM- 3
06/12/2025



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- 00 01 15 List of Drawing Sheets

PROCUREMENT REQUIREMENTS

- 00 21 13 Instructions to Bidders
- 00 41 00 Bid Forms
- 00 43 10 Procurement Form Supplements – Restoration
- 00 45 13 Bidder's Qualification Statement- Structural Restoration Work



DIVISION 01 - GENERAL REQUIREMENTS

- 01 11 10 Summary of Work - Restoration
- 01 21 00 Allowances
- 01 26 00 Contract Modification Procedures
- 01 29 00 Payment Procedures
- 01 31 00 Project Management and Coordination
- 01 32 00 Construction Progress Documentation
- 01 33 00 Submittal Procedures
- 01 40 00 Quality Control
- 01 50 00 Temporary Facilities and Controls
- 01 60 00 Product Requirements
- 01 73 00 Execution
- 01 77 00 Closeout Procedures
- 01 78 39 Project Record Documents

DIVISION 02 – EXISTING CONDITIONS

- 02 51 30 General Concrete Surface Preparation
- 02 51 40 Surface Preparation for Patching and Overlay

DIVISION 03 – CONCRETE

- 03 30 21 Cast-in-Place Concrete Restoration
- 03 37 50 Latex Modified Concrete and Mortar
- 03 37 60 Prepackaged Repair Mortar
- 03 63 00 Epoxy Injection System

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

- 07 81 00 Applied Fire Protection
- 07 92 00 Joint Sealants
- 07 92 33 Concrete Joint Sealants

FRANK CROWLEY COURTHOUSE

Building Repairs

Walker Project No. 27-001211.01

Construction Documents

March 24, 2025

Issued for Bidding

DIVISION 09 - FINISHES

09 91 23 Interior Painting

09 96 60 High Performance Coatings

DIVISION 09 – EARTHWORK

31 45 01 Injection Grouting with HDPF

END OF SECTION 00 01 10

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SECTION 00 01 15 - LIST OF DRAWING SHEETS

Sheet No.	Title
R-000	Cover Sheet
R-001	General Notes and Site Plan
R-100	Basement Level Floor Plan- Area A
R-101	Basement Level Floor Plan- Area B
R-102	Basement Level Floor Plan- Area C
R-103	Level One Floor Plan
R-104	Level Two Floor Plan
R-105	Level Three Floor Plan- Area A
R-106	Level Three Floor Plan and Level 4 Floor Plan- Area B
R-107	Level Three Floor Plan-C
R-108	Level Four Floor Plan- Area A
R-109	Level Five Floor Plan
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R-114	Level Ten Floor Plan
R-115	Level Ten Framing Plan- Area A
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R-201	East Elevation
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R-203	West Elevation
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R-501	Repair Details
R-502	Repair Details

END OF SECTION 00 01 15

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SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS

10.1 PROJECT IDENTIFICATION AND DEFINITIONS

- A. Owner will receive sealed Bids for: [Frank Crowley Courthouse Building Repairs](#)
- B. Owner is: [Dallas County](#)
- C. Engineer/Architect is: [WALKER Consultants](#). Address: [12377 Merit Drive, Suite 420, Dallas, TX 75251](#)
- D. Project consists of providing all materials, labor, equipment, supervision, and services required to perform repairs in the [Frank Crowley Courthouse Building](#) in accordance with the Contract Documents.
- E. Bids will be received for single contract.

10.2 DOCUMENTS

- A. Contract between Owner and Contractor: Contract Documents listed in Agreement. Also see Section "Agreement Form."
- B. Contract Documents may be examined by the Owner and/or the Engineer.
- C. Complete sets of Bidding Documents shall be used in preparing Bids. Neither Owner nor Engineer/Architect assume any responsibility for errors or misinterpretations resulting from use of incomplete sets of Bidding Documents.
- D. Owner and Engineer/Architect in making copies of Bidding Documents available on above terms do so only for purpose of obtaining Bids on Work and do not confer license or grant for any other use.

10.3 MINIMUM QUALIFICATIONS OF BIDDERS

- A. Owner may make such investigation as it deems necessary to determine ability of Bidder to perform Work, and Bidder shall furnish to Owner all such information and data for this purpose as Owner may request. Owner reserves right to reject any Bid if evidence submitted by, or investigation of, such Bidder fails to satisfy Owner that such Bidder is properly qualified to carry out obligations of Contract and to complete Work contemplated therein. Conditional Bids and voluntary alternates will not be accepted.
- B. Bidding firms will not be considered qualified if:
 - 1. Firm, or principals thereof, have defaulted on any contract, bid or bond within preceding 36 months, or;
 - 2. Firm has had no previous experience in performance of Work being bid, or;

3. Firm, as name entitled, has not been in operation in this type of Work for period of 24 months prior to this bid date, or;
4. Firm has not been awarded any prior contracts of similar amount and kind, or;
5. Firm, or principals thereof, have failed in faithful performance during warranty or guarantee period on previous Work.
6. Firm is found to have misstated or omitted any material fact in this prequalification statement.

C. Minimum Qualifications

1. Comprehensive financial statement showing current balance of unencumbered net worth equal to at least 10% of value of anticipated bid price.
2. Comprehensive list of personnel and equipment available for performance of Work to be bid.
3. Complete list of all contract work performed, or under construction if contract(s) awarded within previous 5 yr period prior to bidding.
4. See Structural Restoration Contractor's Qualification Statement section for additional requested information and submittal forms.

10.4 EXAMINATION OF CONTRACT DOCUMENTS AND SITE

- A. Bidders shall carefully examine contract documents and site to obtain first-hand knowledge of existing conditions. No subsequent extras will be allowed due to any claim of lack of knowledge for conditions which can be determined by examining site and contract documents.
- B. Extent of repairs is approximately represented on Drawings. Actual locations and extent of repair may deviate from that represented on Drawings based on field conditions.
- C. Submission of Bid shall constitute warranty that:
 1. Bidder and all Subcontractors it intends to use have carefully and thoroughly reviewed Contract Documents and have found them complete and free from ambiguities and sufficient for purposes intended; further that,
 2. Bidder and all workers, employees and Subcontractors it intends to use are skilled and experienced in type of construction represented by Contract Documents bid upon; further that,
 3. Neither Bidder nor any of its employees, agents, suppliers or Subcontractors have relied on any verbal representations from Owner, Engineer/Architect, or any of their employees, agents, or consultant, in assembling Bid figure; and further that,
 4. Bid figure is based solely on Contract Documents, including properly issued written addenda, and not upon any other written representation.
 5. Reference is made to Supplementary Conditions for identification of those reports of investigations and tests of subsurface and latent physical conditions at site or otherwise affecting cost, progress or performance of Work which have been relied upon by Engineer/Architect in preparing Drawings and Specifications. These reports are not guaranteed as to accuracy or completeness, nor are they

part of Contract Documents. Before submitting its Bid, each bidder may, at its own expense, make such additional investigations and tests as it may deem necessary to determine its Bid for performance of Work in accordance with time, price and other terms and conditions of Contract Documents.

- D. Bidder shall identify, prior to bid, all errors and/or discrepancies in Contract Documents that would be apparent to reasonably diligent Bidder. In no case shall Bidder, if selected as Contractor, be permitted any extra amount of time or money to complete project, or expenses incurred as result of such errors or discrepancies.

10.5 RESOLUTION OF DISCREPANCIES AND AMBIGUITIES

Refer to Dallas County front end Documents.

10.6 SUBSTITUTED MATERIAL AND EQUIPMENT

- A. Contract, if awarded, will be on basis of material and equipment described in Drawings or specified in Specifications without consideration of possible substitute or "or-equal" items. Whenever it is indicated in Drawings or specified in the Specifications that substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Engineer/Architect, application for such acceptance will not be considered by Engineer/Architect until after "effective date of Agreement."
- B. List of substitutions for products or materials specified for Project must be submitted with the completed bid.

10.7 BASIS FOR BIDS

- A. Bids are based on lump sum contract at unit prices. Work Item quantities are based on Engineer/Architect's estimates.
- B. Bids are based on lump sum contract.

10.8 PREPARATION OF BIDS

Refer to Dallas County front end Documents.

10.9 BID SECURITY

Refer to Dallas County front end Documents.

10.10 PERFORMANCE BOND, LABOR AND MATERIAL PAYMENT BOND AND INSURANCE

Refer to Dallas County front end Documents.

10.11 SUBCONTRACTOR LISTING

- A. If Supplementary Conditions require identity of certain Subcontractors and other persons and organizations to be submitted to Owner in advance of Notice of Award, apparent successful Bidder, and any other Bidder so requested, shall within seven days after day of Bid opening submit to Owner list of all Subcontractors and other persons and organizations (including those who are to furnish principal items of material and equipment) requested/suggested for those portions of Work as to which such identification is so required. Such list shall be accompanied by experience statement with pertinent information as to similar projects and other evidence of qualification for each such Subcontractor, person and organization if requested by Owner.
- B. If Owner or Engineer/Architect after due investigation has reasonable objection to any Subcontractor, other person or organization, either may request apparent Successful Bidder to submit acceptable substitute before giving Notice of Award. If apparent successful Bidder declines to make any such substitution, contract shall not be awarded to such Bidder, but Bidder's declining to make any such substitution will not constitute grounds for sacrificing its Bid Security. Any Subcontractor, other person or organization so listed and to whom Owner or Engineer/Architect does not make written objection prior to the giving of Notice of Award will be deemed acceptable to Owner and Engineer/Architect.
- C. In contracts where Contract Price is on basis of Cost-of-the-Work Plus a Fee, apparent Successful Bidder, prior to Notice of Award, shall identify in writing to Owner those portions of Work that such Bidder intends to subcontract and after Notice of Award may only subcontract other portions of Work with Owner's written consent.
- D. No Contractor shall be required to employ any Subcontractor, other person or organization against whom it has reasonable objection.

10.12 IDENTIFICATION AND SUBMISSION OF BIDS

- A. Bids shall be submitted in duplicate at time and place indicated in Invitation to Bid and shall be placed in opaque sealed envelope, marked with Project title, and name and address of Bidder, and accompanied by Bid Security and other required documents.

10.13 MODIFICATION OR WITHDRAWAL OF BIDS

- A. Bids may be withdrawn by written or telegraphic request dispatched by Bidder in time for delivery, in normal course of business, prior to time fixed for opening of Bids, provided that written confirmation of any telegraphic withdrawal, over signature of Bidder, is placed in mail and postmarked prior to time set for opening Bids.

10.14 GOVERNING LAWS AND REGULATIONS

- A. No Contractor shall discriminate against any employee or applicant for employment, to be employed in performance of contract, with respect to their hire, tenure, terms, conditions or privileges of employment, because of their race, color, religion, gender, national origin or age pursuant to requirements of all applicable federal and state statutes.
- B. Each Bidder shall make affidavit that its Bid is genuine and not sham or collusive or made in interests or on behalf of any person not therein named and that Bidder has not directly or indirectly induced or solicited any Bidder to put in sham Bid or any other person or corporation to refrain from Bidding, and that Bidder has not in any manner sought by collusion to secure itself an advantage over other Bidders.

10.15 CONTRACT TIME

- A. Time is of essence in performance of Work under this Contract. Available time for Work under this Contract is indicated in Bid Form and will be include in executed Agreement. If these time requirements cannot be met, Bidder is requested to stipulate in Bid schedule for performance of Work. Consideration will be given to time in evaluating Bids.

10.16 PRE-BID CONFERENCE

- A. A pre-bid conference will be held as listed below.

[Date to be determined.](#)

10.17 DISQUALIFICATION OF BIDDERS

- A. In evaluating Bids after Bids are opened and prior to Award of Contract, Owner shall consider qualifications of Bidders, whether or not Bids comply with prescribed requirements, and alternates and unit prices if requested in Bid Forms.
- B. Owner may consider qualifications and experience of Subcontractors and other persons and organizations (including those who are to furnish principal items of material or equipment) submitted/recommended by Bidders for those portions of Work as to which identity of Subcontractors and other persons and organizations must be submitted. Operating costs, and maintenance considerations, performance data and guarantees of materials and equipment may also be considered by Owner.
- C. Owner may conduct such investigations as it deems necessary to assist in evaluation of any Bid and to establish responsibility, qualifications and financial ability of Bidders, Subcontractors and other persons and organizations to do Work in accordance with Contract Documents to Owner's satisfaction within prescribed time.
- D. Owner reserves right to reject Bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.

- E. Owner reserves right to disqualify Bids before or after opening, upon evidence of collusion with intent to defraud or other illegal practices upon part of Bidder.

10.18 BIDS TO REMAIN OPEN

Refer to Dallas County front end Documents.

10.19 AWARD OF CONTRACT

Refer to Dallas County front end Documents.

10.20 EXECUTION OF CONTRACT

Refer to Dallas County front end Documents.

10.21 UNIT PRICE

- A. List of Unit Prices upon forms bound with Section "List of Unit Prices" must be submitted with the completed bid.
- B. If Owner or Engineer/Architect after due investigation has reasonable objection to any unit price, either may request apparent Successful Bidder to submit acceptable revision without increase in Bid price before giving Notice of Award. If apparent Successful Bidder declines to make any such revision, Contract shall not be awarded to such Bidder, but Bidder's declining to make any such revision will not constitute grounds for sacrificing Bid Security. Any unit price so listed and to which Owner or Engineer/Architect does not make written objection prior to giving of Notice of Award will be deemed acceptable to Owner and Engineer/Architect.

10.22 CONTRACT PRICE

- A. Bids are solicited on basis of unit prices and/or lump sum prices which are to be clearly set forth in Bid Form. Final Contract price on accepted Bids will be determined by multiplying number, or fraction thereof, units of Work actually performed, or labor, material or appliances actually supplied, by price designated for such item in Bid. Total Bid figure on Bid Form is merely for purposes of estimating and comparing costs and under no circumstances on unit price contracts does it constitute or imply total Contract price.

END OF SECTION 00 21 13

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Name of Bidder _____

SECTION 00 41 00 - BID FORMS

30.1 INSTRUCTIONS

Submit Bids on this Bid Form in accordance with Instructions to Bidders.

30.2 BID FORM

PART 1 - TERMS OF BID

PROJECT IDENTIFICATION:

CONTRACT IDENTIFICATION AND NUMBER:

THIS BID IS SUBMITTED TO: [Dallas County](#)

- A. The undersigned BIDDER offers and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in form included in Contract Documents to complete all Work as specified or indicated in Contract Documents for Contract Price and within Contract Time indicated in this Bid and in accordance with Contract Documents.
- B. BIDDER accepts all of terms and conditions of Instructions to Bidders, including without limitation those dealing with disposition of Bid Security. BIDDER will sign Agreement and submit Contract Security and other documents required by Contract Documents within 15 days after date of OWNER's Notice of Award. This Bid will remain open for 60 days after day of Bid opening.
- C. In submitting this Bid, BIDDER represents, as more fully set forth in Agreement, that:
 - 1. BIDDER has examined copies of all Contract Documents and of following addenda:

Date	Number
_____	_____
_____	_____

- (receipt of all of which is hereby acknowledged) and also copies of Advertisement or Invitation to Bid or Instructions to Bidders.
- 2. BIDDER has examined site and locality where Work is to be performed, legal requirements (federal, state and local laws, ordinances, rules and regulations) and conditions affecting cost, progress or performance of Work and has made such independent investigations as BIDDER deems necessary.
 - 3. This Bid is genuine and not made in interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement

Name of Bidder _____

or rules of any group, association, organization or corporation; BIDDER has not directly induced or solicited any other Bidder to submit false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER; and

4. BIDDER agrees that Work Item quantities are estimates and that OWNER may increase or decrease these quantities at unit prices stated, so long as increases or decreases in Base Bid do not exceed 25% of Base Bid price. Increases or decreases beyond these limits shall be in accordance with Supplementary Conditions, Division 00.
5. BIDDER agrees that all alterations or additions to Work shall be performed in accordance with paragraph "Changes" and/or "Construction Change Directives" under Section "Supplementary Conditions."
6. OWNER reserves right to delete any Section of Work.

- D. BIDDER agrees that Work shall be substantially completed and fully completed on or before dates or within number of calendar days indicated in Agreement.

shall be substantially completed on or before
_____, 20 _____

and fully completed by
_____, 20 _____

shall be substantially completed within ____ calendar days after date when Contract Time commences to run, and fully completed within ____ calendar days after date when Contract Time commences to run.

BIDDER accepts provisions of Agreement as to liquidated damages in event of failure to complete Work on time.

- E. BIDDER will complete Work for following price(s)

LUMP SUM CONTRACT PRICE _____
(use words)

_____ DOLLARS \$ _____
(figures)

- F. BIDDER will complete Work for the prices shown in Section "List of Unit Prices."

Name of Bidder _____

- G. Communications concerning this Bid shall be addressed to: (BIDDER to provide bidder's name, address, telephone number and name of individual familiar with this Bid and able and authorized to answer questions regarding this Bid.)

- H. Terms used in this Bid which are defined in General Conditions of Construction Contract included as part of Contract Documents have meanings assigned to them in General Conditions.

SUBMITTED ON _____, 20 _____

PART 2 - MATERIAL AND EQUIPMENT ALTERNATES

Base Bid price shall include materials and equipment selected from designated items and manufacturers listed. The purpose of this requirement is to establish uniformity in bidding and to establish standards of quality for items named.

If BIDDER wishes to quote alternate items for consideration by Owner, it may do so under this Section. Complete description of item and the price differential must be provided. Unless approved at time of award, substitutions where items are specifically named will be considered only as negotiated change in Contract Sum.

<u>WORK ITEM</u>	<u>DESCRIPTION OF ALTERNATE ITEM(S)</u>	<u>ADD/DEDUCT AMOUNT</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Name of Bidder _____

PART 3 - TIME ALTERNATE

If BIDDER takes exception to time stipulated in Part 1, Terms of Bid, it shall stipulate below its suggested time for performance of Work. Consideration will be given to time in evaluating Bids.

BIDDER agrees that Work shall be substantially completed within ____ calendar days after date when Contract Time commences to run, and fully completed within ____ calendar days after date when Contract Time commences to run.

PART 4 - ATTACHMENTS

Following documents are attached to and made condition of this Bid, unless noted otherwise:

- A. Required Bid Security in form of:
- B. Substitution listing per the requirements of the Instructions to Bidders within 7 days after the day of the Bid opening.
- C. Equipment Suppliers' Listing.
- D. List of alternates/alternatives.
- E. List of Unit Prices.
- F. Non-Collusion Affidavit.
- G. A list of Subcontractors and other persons and organizations required to be identified, if so requested, per the requirements of the Instructions to Bidders within 7 days after the day of the Bid opening.
- H. Required Bidders Qualification Statement for Structural Restoration Work with supporting data per requirements of Instructions to Bidders within 7 days after day of Bid opening. Use form attached to Section "Instructions to Bidders." Copies of previously prepared statements on this form which are less than 12 months old will be acceptable.

Name of Bidder _____

PART 5 - SIGNATURES

If BIDDER is:

An Individual

By _____ (SEAL)
(Individual's Name)

doing business as _____

Business Address: _____

Phone Number: _____

A Partnership

By _____ (SEAL)
(Firm Name)

_____ (General Partner)

_____ (General Partner)

Business Address: _____

Phone Number: _____

Name of Bidder _____

A Corporation

By _____
(Corporation Name)

(State of Incorporation)

By _____
(Name of Person Authorized to Sign)

(Title)

(Corporate Seal)

Attest _____
(Secretary)

Business Address: _____

Phone Number: _____

A Joint Venture

By _____
(Name)

(Address)

By _____
(Name)

(Address)

Each joint venture member must sign. The manner of signing for each individual partnership and corporation that is party to joint venture should be in manner indicated above.

END OF SECTION 00 41 00

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SECTION 00 43 10 – PROCUREMENT FORM SUPPLEMENTS-RESTORATION

1.1 CONSTRUCTION PHASING, SEQUENCING AND WORK HOURS

- A. Owner will continue to use the structure during restoration. Contractor must phase and arrange work to maintain access at all times to all areas that are not under construction.
- B. Contractor should coordinate with the owner to limit the construction inconveniences and for optimal use of the property.
- C. Work hours are 7 am - 4 pm, Monday - Friday. The contractor shall verify work hours with the owner. Contractor shall coordinate off-hours, weekend, and holiday work with the owner at least 72 hours in advance.

1.2 LIST OF ALTERNATES

- A. This Section identifies potential changes in the work under consideration for this contract. The Owner reserves the right to accept any or all of the listed Alternates, regardless of the order of their listing.
- B. For each of the Alternates listed below, state the total amount to be added to, or deducted from, the total contract amount if the individual Alternate is selected for inclusion in the contract scope. Amount shown shall include all costs to perform the Work, no extras will be permitted for failure to consider such items as extra permits, overtime, weather protection, etc.

1. Night work:

State added cost (and percentage) to perform all work shown between the hours of 8:00 PM and 5:00 AM Sunday night through Friday morning. If only portions of the Work are selected to be performed during these hours, the added percentage shown will be applied to the Work Items affected.

(____%) _____ Dollars. (in words)
(\$_____) (numbers)

2. Weekend Work:

State added cost (and percentage) to perform all work show between the hours of 8:00 PM Friday through 8:00 PM Sunday. If only portions of the Work are selected to be performed during these hours, the added percentage shown will be applied to the Work Items affected.

(____%) _____ Dollars (in words)
(\$_____) (numbers)

3. Painting Ceilings:

State added cost to paint all ceilings on Level. Refer to Division 09, Section for Painting for Materials and Other Requirements.

_____ Dollars (in words)
(\$ _____) (numbers)

_____ Dollars (in words)
(\$ _____) (numbers)

1.3 UNIT PRICES

- A. The quantities given in Section 1.4 table shall be used for the bid award. Provide unit prices in Section 1.4 table. Change Orders shall be used if excess quantities than shown in Section 1.4 table are found. Procedures for submitting and handling Change Orders are included in Division 01 Section "Contract Modification Procedures.

1.4 LIST OF UNIT PRICES

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
3.0	CONCRETE FLOOR REPAIR				
3.1	Floor Repair-Partial Depth	S.F.	20		\$
3.6	Slab Repair - Gravity Fed Epoxy	L.F.	2000		\$
3.9	Elastomeric Grout Injection	S.F.	500		\$
5.0	CONCRETE BEAM REPAIR				
5.1	Beam Repair - Partial Depth/Shallow	S.F.	10		\$
PART IV: CRACKS AND JOINTS					
11.0	CRACK AND JOINT REPAIR				
11.1	Rout and Seal Crack	L.F.	750		\$
11.2	Joint Sealant	L.F.	3000		\$
11.3	Vertical Joint Sealant	L.F.	20		\$
11.7	Cove Sealant	L.F.	200		\$
PART VII: MECHANICAL/ELECTRICAL SYSTEMS					
26.0	MECHANICAL-FIREPROTECTION				
26.5	Fireproofing Replacement	S.F.	200		\$
30.0	ELECTRICAL-LIGHTING				
30.6	Repair broken lightening protection cable	L.F.	65		\$
PART VIII: ARCHITECTURAL REPAIRS					
37.0	DOOR, FRAMES, AND HARDWARE				
37.3	Door Threshold	E. A	1		\$
PART IX: METAL WORK					
40.0	CONNECTION/BEARINGS				
40.6	Install Missing Bolts	E.A.	25		\$
40.7	Install Corrosion Resistant Fasteners	E.A.	10		\$
40.8	Install Guardrails at Roof Crossover	E.A.	1		\$
40.9	Handrail Repair at Elevator Penthouse	L.F.	10		\$
42.0	RESERVED FOR NONSTANDARD WORK				
42.1	Channel Support at Plaza Deck	L.F.	100		\$
45.0	RESERVED FOR NONSTANDARD WORK				
45.6	Abrasively Blast and Repaint Staircase Exhibiting Corrosion	E.A.	120		\$
45.7	Remove Peeling Paint and Repaint underside of Stair Landing	L.S			\$
45.8	Replace Bent Grating	E.A.	1		\$
45.9	Install Missing Handrail	E.A.	1		\$
46.0	RESERVED FOR NONSTANDARD WORK				
46.1	Repair and Replace Bent Metal Deck	S.F.	25		\$
46.2	Repair and Replace Corroded Metal Deck	S.F.	100		\$
46.3	Steel Beam-Cleaning, Coating and Installation of Fireproofing	S.F.	400		\$
46.5	Remove and Replace Damaged Bollard	E.A.	2		\$
100.0	ADDITIONAL IDENTIFIED COSTS (TO BE LISTED BY CONTRACTOR)				
GRAND TOTAL					\$

3

1

1

1

2

L.F. = Lineal Feet
EA = Each
S.F. = Square Feet
L.S. = Lump Sum

1.5 RESPONSIVE BIDDERS

To be considered a responsive bidder all line items above need to be entered with an amount (even if it is \$0.00) including Unit Pricing

*Contingency is a quantity of work or dollar amount established in addition to the quantities given the above table. To adjust quantities, prepare a Change Order bid based on the difference between purchase amount and the additional quantities. Obtain Engineer's and Dallas County approvals before starting additional work.

1.6 NON-COLLUSION AFFIDAVIT

Bidder, by its officers and its agents or representatives present at the time of filing this Bid, being duly sworn on their oaths say, that neither they nor any of them have in any way, directly or indirectly, entered into any arrangement or agreement with any other Bidder, or with any officer of CLIENT whereby such affiant or affiants or either of them has paid or is to pay such other Bidder or officer any sum of money, or has given or is to give to such other Bidder or officer anything of value whatever, or such affiant or affiants or either of them has not directly or indirectly, entered into any arrangement or agreement with any other free competition into the letting of the contract sought for by the attached Bids that no inducement of any form or character other than that which appears on the face of the Bid will be suggested, offered, paid or delivered to any person whomsoever to influence the acceptance of the Bid or awarding of the Contract, nor has this Bidder any agreement or understanding of any kind whatsoever, with any person whomsoever to pay, deliver to, or share with any other person in any way or manner, any of the proceeds of the Contractor sought by this Bid.

Submitted By:

Type or print firm name:

Authorized Signature:

Date:

1.7 LIST OF SUBCONTRACTORS

	COMPANY ADDRESS	CONTACT PERSON NAME PHONE NUMBER FAX NUMBER
Demolition	_____ _____ _____	_____ _____ _____
Landscaping	_____ _____ _____	_____ _____ _____
Paving	_____ _____ _____	_____ _____ _____
Ready-Mix Concrete	_____ _____ _____	_____ _____ _____
Concrete Reinforcement	_____ _____ _____	_____ _____ _____
Masonry	_____ _____ _____	_____ _____ _____
Protective Sealer	_____ _____ _____	_____ _____ _____
Traffic Topping	_____ _____ _____	_____ _____ _____
Expansion Joints	_____ _____ _____	_____ _____ _____
Sealants and Caulking	_____ _____	_____ _____

	COMPANY ADDRESS	CONTACT PERSON NAME PHONE NUMBER FAX NUMBER
Control Joint Sealant	_____ _____ _____	_____ _____ _____
Cove Sealant	_____ _____ _____	_____ _____ _____
Doors and Windows	_____ _____ _____	_____ _____ _____
Graphics	_____ _____ _____	_____ _____ _____
Plumbing	_____ _____ _____	_____ _____ _____
Fire Protection	_____ _____ _____	_____ _____ _____
HVAC	_____ _____ _____	_____ _____ _____
Electrical	_____ _____ _____	_____ _____ _____

END OF SECTION 00 43 10

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SECTION 00 45 13 – BIDDER’S QUALIFICATION STATEMENT - STRUCTURAL RESTORATION WORK

This statement is required in advance of consideration of application to bid or as a qualification statement in advance of a restoration contract.

SUBMITTED TO: Dallas County Facility Management
133 N. Riverfront Blvd. 9th Floor.
Dallas, TX 75207
Kumar Pilla

Attn: _____

SUBMITTED BY: _____

ADDRESS: _____

PHONE: (____) _____

CONTACT: _____

COMPANY STRUCTURE:

- Corporation
- Partnership
- Individual
- Joint Venture
- Other (Explain)

SPECIAL CERTIFICATIONS:

- MBE
- WBE
- Other (Explain): _____

SUBMITTAL DATE: _____

AREA(S) OF EXPERTISE: (Check all that apply)

- | | | |
|--|--------------------------|------------------------|
| <input type="checkbox"/> EIFS Repair | <input type="checkbox"/> | Concrete/Steel Repairs |
| <input type="checkbox"/> Waterproofing/Jts. & Sealants | <input type="checkbox"/> | Brick/Masonry |
| <input type="checkbox"/> Waterproofing/ Sealers | <input type="checkbox"/> | Historic Buildings |
| <input type="checkbox"/> Waterproofing/Roofing | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> Waterproofing/Plaza Systems | <input type="checkbox"/> | _____ |

FRANK CROWLEY COURTHOUSE

Building Repairs

Walker Project No. 27-001211.01

Construction Documents

March 24, 2025

Issued for Bidding

16. Attach your company's most recent audited Balance Sheet, prepared in accordance with generally accepted accounting principles.

Date of Balance Sheet: _____

Name of firm Balance Sheet: _____

DATED AT _____ THIS _____ DAY OF _____, 20____.

Name of Organization: _____

By: _____

TITLE: _____

STATE OF: _____

COUNTY OF: _____

_____ being duly sworn, deposes and says that he/she is _____ of the above organization and that the answers to the questions in the foregoing questionnaire and all statements therein contained are true and correct.

SUBSCRIBING AND SWORN TO BEFORE ME THIS _____ DAY OF _____ 20____.

NOTARY PUBLIC: _____

MY COMMISSION EXPIRES: _____

TABLE I - LAST FIVE RESTORATION JOBS COMPLETED			
Name and Address of Contractor			Date:
Name and Address of Owner	Type of Restoration Work	Contract Amount	Date Completed

TABLE II - LIST OF STRUCTURAL RESTORATION IN PROGRESS

Name and Address of Contractor			Date:
Name and Address of Owner	Type of Work	Contract Amount	Expected Completion Date

TABLE III - CONSTRUCTION EXPERIENCE OF PRINCIPALS AND SUPERINTENDENTS

Name and address of Contractor:					Date:
Name	Position	Years Experience		Type of Work	Contract Amount
		Construction	Restoration		

FRANK CROWLEY COURTHOUSE
Building Repairs
Walker Project No. 27-001211.01

Construction Documents
October 17, 2024
Issued for Bidding

TABLE IV - RATINGS BY STATE HIGHWAY DEPARTMENTS			
Name and address of Contractor:			Date:
State	Rating	Contact & Phone No.	Highway Jobs for Ea. State

TABLE V - LIST OF EQUIPMENT

Name and address of Contractor:		Date:	
Description of Equipment	Quantity	Years of Service	Current Book Value

END OF SECTION 00 45 13

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SECTION 01 11 10 - SUMMARY OF WORK - RESTORATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 PROJECT DESCRIPTION

- A. Work consists of repairs for the structure.
 - 1. Partial depth repair of soffit, and walls.
 - 2. Slab repair using Gravity-fed Epoxy
 - 3. Installation of additional fireproofing on exposed structural steel.
 - 4. Repair of broken lighting protection cable.
 - 5. Installing missing bolts.
 - 6. Installing corrosion resistant fasteners at preformed metal sliding.
 - 7. Install of guardrails at roof crossover.
 - 8. Install steel railing at elevator penthouse.
 - 9. Install channel support at plaza deck.
 - 10. Abrasively blast and repaint staircase exhibiting corrosion.
 - 11. Remove peeling paint and repaint underside of stair landing.
 - 12. Replace bent grating.
 - 13. Install missing handrail.
 - 14. Repair and replace corrugated metal deck
 - 15. Repair and replace corroded metal deck
 - 16. Remove existing fireproofing, clean corrosion, paint with corrosion inhibitive coating, and reapply fireproofing
 - 17. Repair and replace bent metal deck

18. Remove and replace damaged bollard

- B. Work will be performed at locations within structure as shown on Drawings.
- C. Work required in these areas and estimated quantities are listed on Bid Form. Bid Quantities associated with Work Items listed on Drawings have been estimated and are subject to measurement as defined in Article "Measurements." Where additional Work Items are described, but not specifically located and/or shown on Drawings, Contractor shall be responsible for locating and marking areas to be repaired. Owner and/or Engineer/Architect reserves right to increase or decrease quantities up to 25% at same unit cost, as required by job conditions. Unit costs will be brought to notice of Engineer for quantity variations exceeding 25%.
- D. Work Item specifications and details shall govern all repair operations. Locations where Work Items apply are shown on Drawings as symbols.
- E. Final payment shall be made on basis of actual approved Work performed as measured in place.
- F. Project comprises of [Fank Crowley Courthouse Building Repairs located at 133 N Industrial Blvd, Dallas, Texas 75207](#)

1.3 MEASUREMENTS

- A. Before ordering any material or doing any Work, Contractor shall verify all measurements at Project site and shall be responsible for correctness of same.
- B. Before proceeding with each Work Item, Contractor shall locate, mark, and measure quantity of each item and report quantities to Engineer/Architect. If measured quantities exceed Engineer/Architect's estimate, Contractor shall obtain written authorization to proceed from Owner before executing Work required for that Work Item.
- C. Measurement of quantities for individual Work Items will be performed by Contractor and reviewed by Engineer/Architect. Coordinate measurements with inspection as required in Section "Project Management and Coordination."
- D. Cost of Work included in each Work Item for quantities as indicated in Contract Documents shall be included in Base Bid.
 - 1. Additions to or deductions from lump sum price for quantities of each Work Item added to or deducted from Work respectively shall be at unit prices indicated in Bid Form and shall constitute payment or deductions in full for all material, equipment, labor, supervision and incidentals necessary to complete Work.

1.4 WORK UNDER OTHER CONTRACTS

- A. Separate contract has been issued to ABC Construction Co. to perform certain construction operations at site. Those operations precede and are scheduled to be substantially completed prior to construction operations under this Contract. That contract includes:
1. Paved access roads and associated site construction.
 2. Underground power cable, telephone cable, and gas line to site.
 3. Water well and temporary water service.

1.5 WORK SEQUENCE

- A. Prior to commencement of work, meet with Engineer/Architect and Owner representatives to establish sequence and schedule of Work. Contractor shall give Owner notice of areas to be cleared of cars at least 2 working days in advance of actual Work.
- B. Contractor shall notify Owner's representative at least 24 hr prior to beginning any abrasive blasting operations.
- C. Contractor shall remove all broken concrete and debris from Work area on daily basis and dispose of same at authorized dump sites.
- D. Contractor shall remove dust and air transported sand/debris from remainder of facility at conclusion of operations in Work area.

1.6 CONTRACTOR USE OF PREMISES

- A. General: During construction period Contractor shall have full use of premises for construction operations, including use of site. Contractor's use of premises is limited only by Owner's right to perform construction operations with its own forces or to employ separate contractors on portions of project.
- B. General: Limit use of premises to construction activities in areas indicated; allow for Owner occupancy and use by public.
1. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.
 2. Keep driveways and entrances serving the premises clear and available to the Owner and Owner's employees at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
 3. Burial of Waste Materials: Prior to final grading and landscape development, existing grade depression near the southwest corner of site, as indicated, may be used for disposal of inert waste material from construction process. Do not dispose of organic and hazardous material on site, either by burial or by burning.

- C. Contractor's use of premises shall not interfere with operation of same. Elevators shall not be used for transfer of materials or equipment.
- D. Contractor's debris removal path shall be over non-repaired services unless physical restraints prevent use of such path.
- E. Contractor shall confine its apparatus, materials, equipment, tool cribs, field offices and operations to areas designated by Owner and/or Engineer/Architect. Premises shall not be unreasonably encumbered with materials and equipment. Neat and orderly stockpiling and other operations shall be maintained and debris shall be regularly removed from site. Contractor shall not load or permit any part of structure to be loaded with weight that will endanger structural integrity or safety of facility.
- F. Contractor Parking: Contractor's employees shall park within confines of work area or pay prevailing parking rates. Contractor shall confirm with owner for parking.
- G. On-Site Storage: Contractor shall not store materials or equipment at site of Work for more than one week prior to time that materials or equipment are incorporated into Work.

1.7 BARRICADES

- A. Provide positive barricading to separate Work areas from areas open to public and to prevent the need for washing cars parked adjacent to the work area. Minimum acceptable separation: 4 ft. 0 in. high solid temporary barrier constructed of wood or concrete. Provide additional barriers as required to prevent damage to vehicle due to airborne debris. See "Temporary Facilities" for additional requirements.

1.8 TRAFFIC OFFICERS AND FLAGMEN

- A. When, in Owner's opinion, it is necessary that uniformed police or security officers be used to protect and control pedestrian traffic, to direct vehicular traffic during construction and to keep traffic off any part of Work, or to protect public safety, a police/security detail will be obtained. All expenses for uniformed officers shall be assumed by Contractor and included in bid price or in prices bid for items of Work to be performed under this Contract.

1.9 CLAIMS

- A. Contractor shall promptly address all damages claims. Owner reserves right to resolve any claims not addressed by Contractor within 3 wks after claim is received by Contractor. Any amounts paid by Owner will be deducted from Contractor's next progress payment.

1.10 OWNER OCCUPANCY (NOT APPLICABLE)

1.11 PRE-ORDERED PRODUCTS (NOT APPLICABLE)

1.12 OWNER-FURNISHED ITEMS (NOT APPLICABLE)

1.13 MISCELLANEOUS PROVISIONS (NOT APPLICABLE)

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 SCHEDULE OF PRE-ORDERED PRODUCTS – NOT USED

END OF SECTION 01 11 10

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SECTION 012100 – ALLOWANCES

PART 1 - GENERALS

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements governing handling and processing allowances.
 - 1. Selected materials and equipment, and in some cases, their installation are shown and specified in 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. Additional requirements, if necessary, will be issued by Change Order.
- B. Types of allowances required include following:
 - 1. Lump-sum allowances.
- C. Procedures for submitting and handling Change Orders are included in Division 01 Section "Contract Modification Procedures."

1.3 DEFINITIONS

- A. Allowance is a quantity of work or dollar amount established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.4 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Engineer of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.
- B. At Engineer's request, obtain bids for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Engineer from the designated supplier.

1.5 QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Engineer under allowance and shall include taxes, freight and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Engineer under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.6 SUBMITTALS

- A. Submit bids for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to indicate actual quantities of materials delivered to site for use in fulfillment of each allowance.
- C. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- D. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.7 LUMP-SUM ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Engineer under allowance and shall include taxes, freight and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Engineer/Engineer under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.8 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order bid based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.

2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
 3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.9 UNUSED MATERIALS

- A. Return unused materials to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
- B. Where it is not economically feasible to return unused material for credit and when requested by Engineer/Engineer, prepare unused material for Owner's storage, and deliver to Owner's storage space as directed. Otherwise, disposal of excess material is Contractor's responsibility.

PART 2 - PRODUCTS (NOT APPLICABLE)

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. Inspect products covered by an allowance promptly upon delivery for damage or defects.

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 construction activities.

3.3 SCHEDULE OF ALLOWANCES

- A. For allowances associated with the project, refer to Section 004310 "Procurement Form Supplements – Restoration."

END OF SECTION 012100

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SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing contract modifications.
- B. Related Requirements:
 - 1. Division 01 Section "Submittal Procedures" for requirements for Contractor's Construction Schedule.
 - 2. Division 01 Section "Payment Procedures" for administrative procedures governing applications for payment.

1.3 MINOR CHANGES IN THE WORK

- A. Engineer will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

1.4 BID REQUESTS

- A. Owner-Initiated Bid Requests: Changes in Work that will require adjustment to Contract Sum or Contract Time will be issued by Engineer, with detailed description of change and supplemental or revised Drawings and Specifications, if necessary.
 - 1. Work Change Bid Requests issued by Engineer are not instructions either to stop work in progress or to execute the work change.
 - 2. Within time specified in Bid Request or 20 days, when not otherwise specified, after receipt of Bid Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.

- d. Include statement indicating effect change in Work will have on Contract Time.
- B. Contractor-Initiated Change Order Bid Requests: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Engineer.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the Contractor-requested change. Indicate the effect of the Contractor-requested change on the Contract Sum and the Contract Time.
 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Include costs of labor and supervision directly attributable to the change.
 5. Submit request no later than 10 working days after discovery of condition.
 6. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 7. Comply with requirements in Division 01, Section "Contract Modification Procedures" if the Contractor-requested change requires substitution of one product or system for product or system specified.
- C. Bid Request Form: Use AIA Document G709 or form acceptable to Engineer.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Bid Request, Construction Manager will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Engineer may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.7 WORK CHANGE DIRECTIVE

- A. Work Change Directive: Engineer may issue a Work Change Directive on EJCDC Document C-940. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

- B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 26 00

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SECTION 01 29 00 - 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 01 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 Requirements:
 - 1. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Division 01 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

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.
 - 1. Correlate line items in the Schedule of Values with items required to be indicated as separate activities in Contractor's construction schedule, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - c. Submit preliminary SOV to Owner prior to construction and Notice to Proceed.
 - 2. After Notice to Proceed, submit the Schedule of Values to Engineer and Owner at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

3. Sub-schedules: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules 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 Engineer.
 - c. Engineer's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 2. 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. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 3. 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 in excess of five percent of the Contract Sum.
 4. 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. Include evidence of insurance or bonded warehousing if required.
 5. 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.
 6. Overhead Costs: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
 7. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.

8. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Engineer and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
 1. Submit draft copy of Application for Payment seven days prior to due date for review by Engineer.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 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. Engineer 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.
 3. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.

- c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Engineer 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.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities 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 conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Waiver Delays: Submit each Application for Payment with Contractor's waiver of mechanic's lien for construction period covered by the application.
 - a. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- H. 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.
 14. Performance and payment bonds.
 15. Data needed to acquire Owner's insurance.
 16. Initial settlement survey and damage report if required.

- I. 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.

- J. 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. AIA Document G707, "Consent of Surety to Final Payment."
 - 7. Evidence that claims have been settled.
 - 8. 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.
 - 9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 29 00

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SECTION 01 31 00 - 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 01 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. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Project meetings.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Construction Progress Documentation" for preparing and submitting the Contractor's Construction Schedule.
 - 2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 01 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, Engineer, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms suggested by Contractor for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, telephone number, and email address 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.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
1. Post copies of list in project meeting room, in temporary field office and in prominent location in built facility. Keep list current at all times.

1.5 COORDINATION

- A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
- B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each 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 with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- C. If necessary, 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.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled 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.
- E. 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.

1.6 SUBMITTALS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - e. Indicate required installation sequences.
 - f. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Engineer indicating suggested resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 2. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.

3. Review: Engineer will review coordination drawings to confirm that in general the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Engineer determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Engineer will so inform Contractor, who shall make suitable modifications and resubmit.
 4. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Division 01, Section "Submittal Procedures."
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
 2. File Preparation Format: DWG Version operating in Microsoft Windows operating system.
 3. File Submittal Format: Submit or post coordination drawing files PDF format.

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Engineer will return without response those RFIs submitted to Engineer by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Engineer.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

- a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Engineer.
1. Attachments shall be electronic files in PDF format.
- D. Engineer's Action: Engineer will review each RFI, determine action required, and respond. Allow seven working days for Engineer's response for each RFI. RFIs received by Engineer after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Engineer's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Engineer's action may include a request for additional information, in which case Engineer's time for response will date from time of receipt by Engineer of additional information.
 3. Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Bid according to Division 01, Section "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log bi-weekly. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Engineer.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Engineer's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Bid Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Bid Request, as appropriate.

- F. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within seven days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Engineer's Data Files Not Available: Engineer will not provide Engineer's CAD drawing digital data files for Contractor's use during construction.
- B. PDF Document Preparation: Where PDFs are required to be submitted to Engineer, prepare as follows:
 - 1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 - 2. Name file with submittal number or other unique identifier, including revision identifier.
 - 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 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 Engineer of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Engineer, within three days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Engineer, but no later than 15 days after execution of the Agreement.
 - 1. Attendees: Authorized representatives of Owner, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. 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. Responsibilities and personnel assignments.

- b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.
 - h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Sustainable design requirements.
 - o. Preparation of Record Documents.
 - p. Use of the premises and existing building.
 - q. Work restrictions.
 - r. Working hours.
 - s. Owner's occupancy requirements.
 - t. Responsibility for temporary facilities and controls.
 - u. Procedures for moisture and mold control.
 - v. Procedures for disruptions and shutdowns.
 - w. Construction waste management and recycling.
 - x. Parking availability.
 - y. Office, work, and storage areas.
 - z. Equipment deliveries and priorities.
 - aa. First aid.
 - bb. Security.
 - cc. Progress cleaning.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for 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 Engineer 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. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Sustainable design requirements.
 - i. Review of mockups.
 - j. Possible conflicts.

- k. Compatibility requirements.
 - l. Time schedules.
 - m. Weather limitations.
 - n. Manufacturer's written instructions.
 - o. Warranty requirements.
 - p. Compatibility of materials.
 - q. Acceptability of substrates.
 - r. Temporary facilities and controls.
 - s. Space and access limitations.
 - t. Regulations of authorities having jurisdiction.
 - u. Testing and inspecting requirements.
 - v. Installation procedures.
 - w. Coordination with other work.
 - x. Required performance results.
 - y. Protection of adjacent work.
 - z. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 - 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.
- A. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Engineer, but no later than 90 days prior to the scheduled date of Substantial Completion.
- 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 - 2. Attendees: Authorized representatives of Owner, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.
 - e. Requirements for completing sustainable design documentation.
 - f. Requirements for preparing operations and maintenance data.
 - g. Requirements for delivery of material samples, attic stock, and spare parts.
 - h. Requirements for demonstration and training.
 - i. Preparation of Contractor's punch list.
 - j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.

- k. Submittal procedures.
- l. Owner's partial occupancy requirements.
- m. Installation of Owner's furniture, fixtures, and equipment.
- n. Responsibility for removing temporary facilities and controls.

B. Progress Meetings: **Conduct** progress meetings at biweekly intervals.

- 1. Coordinate dates of meetings with preparation of payment requests.
- 2. Attendees: In addition to representatives of Owner and Engineer, 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.
- 3. 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) Status of sustainable design documentation.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site use.
 - 9) Temporary facilities and controls.
 - 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of correction of deficient items.
 - 13) Field observations.
 - 14) Status of RFIs.
 - 15) Status of Bid Requests.
 - 16) Pending changes.
 - 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - 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.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 31 00

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SECTION 01 32 00 - 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 01 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. Startup Construction Schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Field condition reports.
 - 7. Unusual event reports.
 - 8. Construction photographs.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
 - 2. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
 - 3. Division 01 Section "Quality Control" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical activities are activities on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor activity is an activity that precedes another activity in the network.
 - 3. Successor activity is an activity that follows another activity in the network.

- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Engineer.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Fagnets: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- H. Major Area: A story of construction, a separate building, or a similar significant construction element.
- I. Milestone: A key or critical point in time for reference or measurement.
- J. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file, where indicated.
 - 2. PDF file.
 - 3. Two paper copies of sufficient size to display entire period or schedule, as required.
- B. Startup Construction Schedule.
 - 1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule of size required to display entire schedule for entire construction period.
 - 1. Submit a working digital copy of schedule, using software indicated and labeled to comply with requirements for submittals. Include type of schedule, Initial or Updated and date. Initial schedule must be submitted within 10 days of date of agreement.
 - 2. After review of initial schedule, submit updated schedule after 10 days.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 - 3. Total Float Report: List of all activities sorted in ascending order of total float.
 - 4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.
- F. Construction Schedule Updating Reports: Submit with Application for Payment
- G. Daily Construction Reports: Submit at biweekly intervals.
- H. Material Location Reports: Submit at weekly intervals.
- I. Site Condition Reports: Submit at time of discovery of differing conditions.
- J. Unusual Event Reports: Submit at time of unusual event.
- K. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Engineer's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 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 submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 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.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. 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.
- B. 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 Engineer.
 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 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 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 5. Commissioning Time: Include no fewer than 15 days for commissioning.
 6. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Engineer's administrative procedures necessary for certification of Substantial Completion.
 7. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. 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. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 6. 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.
 7. 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. Building flush-out.
 - m. Startup and placement into final use and operation.
 - n. Commissioning.
8. Construction Areas: 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. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
1. Refer to Division 01 Section "Payment Procedures" for cost reporting and payment procedures.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and Contract Time.
- G. 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 final completion percentage for each activity.

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

1.8 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.
 - 2. List of separate contractors at Project site.
 - 3. Approximate count of personnel at Project site.
 - 4. Equipment at Project site.
 - 5. Material deliveries.
 - 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 - 7. Testing and inspection.
 - 8. Accidents.
 - 9. Meetings and significant decisions.
 - 10. Unusual events.
 - 11. Stoppages, delays, shortages, and losses.
 - 12. Meter readings and similar recordings.
 - 13. Emergency procedures.
 - 14. Orders and requests of authorities having jurisdiction.
 - 15. Change Orders received and implemented.
 - 16. Work Change Directives received and implemented.
 - 17. Services connected and disconnected.
 - 18. Equipment or system tests and startups.
 - 19. Partial completions and occupancies.
 - 20. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals, prepare a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
 2. Material stored prior to previous report and since removed from storage and installed.
 3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D. Unusual Event Reports: 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, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points.
1. Take 20 photographs to show existing conditions before starting the Work.
- C. Periodic Construction Photographs: Take 20 photographs weekly coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- D. Final Completion Construction Photographs: Take 50 photographs after date of Substantial Completion for submission as Project Record Documents.

END OF SECTION 01 32 00

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SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Division 01 Section "Payment Procedures" For submitting Applications for Payment and the schedule of values.
 - 2. Division 01 Section "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
 - 3. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 4. Division 01 Section "Quality Requirements" for submitting test and inspection reports and schedule of tests and inspections.
 - 5. Division 01 Section "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Engineer's approval. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals 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.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Engineer's final release or approval.

1.5 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
1. Project name.
 2. Date.
 3. Name of Engineer.
 4. Name of Contractor.
 5. Name of firm or entity that prepared submittal.
 6. Names of subcontractor, manufacturer, and supplier.
 7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier, and alphanumeric suffix for resubmittals.
 8. Category and type of submittal.
 9. Submittal purpose and description.
 10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
 11. Drawing number and detail references, as appropriate.
 12. Indication of full or partial submittal.
 13. Location(s) where product is to be installed, as appropriate.

14. Other necessary identification.
 15. Remarks.
 16. Signature of transmitter.
- B. Options: Identify options requiring selection by Engineer.
- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Engineer on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
- D. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.
- E. Submittals for Web-Based Project Software: Prepare submittals as PDF files, or other format indicated by Project software website.

1.6 SUBMITTAL PROCEDURES

- A. Engineer's Digital Data Files: Electronic digital data files of the Contract Drawings will not be provided by Engineer for Contractor's use in preparing submittals.
- B. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Email: Prepare submittals as PDF package and transmit to Engineer by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Engineer.
 - a. Engineer will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections 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.

- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 calendar 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 15 calendar days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Engineer's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Engineer and to Engineer's consultants, allow **15 calendar** days for review of each submittal. Submittal will be returned to **Engineer** before being returned to Contractor.
- E. Resubmittals: Engineer will review each of Contractor's submittals the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse the cost of Engineer's services made necessary to review such additional resubmittals.
1. Make resubmittals in same form and number of copies as initial submittal.
 - a. Note date and content of previous submittal.
 - b. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - c. Resubmit submittals until they are marked with approval notation from Engineer's action stamp.
- F. 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.
- G. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Engineer's action stamp.

1.7 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are unsuitable 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 catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
 - a. Two opaque (bond) copies of each submittal. Engineer will return one copy.
 - b. Three opaque copies of each submittal. Engineer will retain two copies; remainder will be returned.

3. BIM Incorporation: Develop and incorporate Shop Drawing files into BIM established for Project.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit **one** full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.
 6. 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 specified material or product, 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.

- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.

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

- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

- G. Certificates:
 1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
 2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
 4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
 5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

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

H. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit 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:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

1.8 DELEGATED-DESIGN SERVICES

- 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 insufficient to perform services or certification required, submit a written request for additional information to Engineer.

- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file of certificate, 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.
- C. BIM Incorporation: Incorporate delegated-design drawing and data files into BIM established for Project.
 - 1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as original Drawings.

1.9 REQUESTS FOR INFORMATION

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

1.10 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.
- B. Project Closeout and Maintenance Material Submittals: See Requirements in Division 01 Section "Closeout Procedures."
- C. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include 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.
 - 1. Engineer will not review submittals received from Contractor that do not have Contractor's review and approval.

1.11 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 or its subconsultant will review each submittal, make marks to indicate corrections or revisions required, and return it.
 - 1. PDF Submittals: Engineer will indicate, via markup on each submittal, the appropriate action.
 - a. See Division 00, Section "Supplementary Conditions" for description of terminology on Engineer's Stamp applied via markup to each submittal.
- C. Informational Submittals: Engineer will review each submittal and will not return it or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Engineer.
- E. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- F. Engineer will return without review submittals received from sources other than Contractor.
- G. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 33 00

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SECTION 01 40 00 - QUALITY CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for quality control services.
- B. Testing and inspection 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 quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.
- C. Related Requirements:
 - 1. Division 01 Section "Cutting and Patching" specifies requirements for repair and restoration of construction disturbed by inspection and testing activities.
 - 2. Division 01 Section "Submittal Procedures" specifies requirements for development of a schedule of required tests and inspections.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

- C. 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, assembly, and similar operations.
1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
1. Laboratory Mockups: Full-size physical assemblies constructed and tested at testing facility to verify performance characteristics.
 2. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as part of permanent construction, consisting of multiple products, assemblies, and subassemblies.
 3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes; doors; windows; millwork; casework; specialties; furnishings and equipment; and lighting.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that construction will comply with requirements.
- J. 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. Contractor's quality-

control services do not include contract administration activities performed by Engineer.

1.4 DELEGATED-DESIGN SERVICES

- 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.

1.5 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Engineer for direction 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.

1.6 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups.
 - 1. Include plans, sections, and elevations, indicating materials and size of mockup construction.
 - 2. Indicate manufacturer and model number of individual components.
 - 3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.
- B. Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit 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, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.7 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- D. Testing Agency Qualifications: 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.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
- F. Reports: Prepare and submit certified written reports and documents as specified.
- G. Permits, Licenses, and Certificates: For Owner's record, 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.

1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award, and not less than five days prior to preconstruction conference. Submit in format acceptable to Engineer. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's Construction Schedule.

- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections including Subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
 - 3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Engineer has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.9 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, telephone number, and email address 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 inspection.

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 reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of technical 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.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.

1.10 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. 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. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. 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.

- D. **Installer Qualifications:** A firm or individual experienced in installing, erecting, applying, 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.
- E. **Professional Engineer Qualifications:** A professional engineer who is legally qualified to practice in jurisdiction where Project is located 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 product that are similar in material, design, and extent to those indicated for this Project.
- F. **Specialists:** Certain Specification Sections 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. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. **Testing Agency Qualifications:** An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. **Manufacturer's Technical Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. **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.
- J. **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 specified 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 and test assemblies, 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.
- K. 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 of size indicated.
 2. Build mockups in location indicated or, if not indicated, as directed by Engineer.
 3. Notify Engineer seven days in advance of dates and times when mockups will be constructed.
 4. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed to perform same tasks during the construction at Project.
 5. Demonstrate the range of aesthetic effects and workmanship.
 6. Obtain Engineer's approval of mockups before starting corresponding work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 8. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph.
- M. Room Mockups: Construct room mockups according to approved Shop Drawings incorporating required materials and assemblies, finished according to requirements. Provide required lighting and additional lighting where required to enable Engineer to evaluate quality of the Work. Comply with requirements in "Mockups" Paragraph.

1.11 RESPONSIBILITIES

- 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 inspection they are engaged to perform.
 2. Payment for these services will be made from testing and inspection 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. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
1. 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.
 2. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. 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.
- D. 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 locations 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 duties of Contractor.

- E. **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 01 Section "Submittal Procedures."
- F. **Manufacturer's Technical Services:** Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. **Associated Contractor Services:** Cooperate with agencies and representatives 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 inspection. 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 for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspection equipment at Project site.
- H. **Coordination:** Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. **Schedule of Tests and Inspections:** Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses.
 - 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.

1.12 SPECIAL TESTS AND INSPECTIONS

- A. **Special Tests and Inspections:** 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.
- B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, 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. Test and Inspection Log: 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 revisions as they occur. Provide access to test and inspection log for Engineer's reference during normal working hours.
 - 1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, 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 or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- 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 01 40 00

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SECTION 01 50 00 - 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 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Division 01, Section "Summary of "Work" for work restrictions and limitations on utility interruptions.
 - 2. Division 01, Section "Temporary Facilities and Controls" for responsibilities for temporary facilities and controls for projects utilizing multiple contracts.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Owner will pay sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Owner will pay water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations.
- E. Water and Sewer Service from Existing System: 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.
- F. Electric Power Service from Existing System: 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.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.
- F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the intended dust- and HVAC-control measures, their locations, and time frame for their operation. Include the following:
 - 1. Locations of dust-control partitions at each phase of work.
 - 2. HVAC system isolation schematic drawing.
 - 3. Location of air-filtration system discharge.
 - 4. Waste-handling procedures.
 - 5. Other dust-control measures.

1.5 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.
- C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to 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. Portable 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 and bottom rails. Provide galvanized-steel bases for supporting posts.
- B. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.2 EQUIPMENT

- A. General: Provide new equipment; if acceptable to Engineer/Architect, undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
- B. Water Hoses: Provide 0.75 in. heavy-duty, abrasion-resistant, flexible rubber hoses 100 ft. long, with pressure rating greater than maximum pressure of water distribution system; provide adjustable shut-off nozzles at hose discharge.
- C. Electrical power cords: provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.
- D. Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material. Locations of units shall be pre-approved by Village.
- E. First Aid Supplies: Comply with governing regulations.
- F. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide

hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.
- G. Temporary Fuel Tanks: Comply with all applicable safety and environmental regulations for temporary surface fuel tanks. Location and installation shall be subject to review and approval of Engineer/Architect and Fire Marshall.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 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.
1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."
- 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.

3.3 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 or private system as directed by authorities having jurisdiction.

- C. **Water Service:** Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. **Sanitary Facilities:** Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. **Temporary 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.
 - 1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- F. **Isolation of Work Areas in Occupied Facilities:** Prevent dust, fumes, and odors from entering occupied areas.
 - 1. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 - 2. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- G. **Electric Power Service:** Connect to Owner's existing electric power service. Maintain equipment 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.

3.4 SUPPORT FACILITIES INSTALLATION

- A. **General:** Comply with the following:
 - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 - 2. Maintain support facilities until Architect schedules Substantial Completion inspection. 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 or endanger permanent Work or temporary facilities.
- E. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 3. Maintain and touch up 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. Comply with progress cleaning requirements in Division 01 Section "Execution."
- G. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided 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.
- H. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided 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 stairs become damaged, restore damaged areas so no evidence remains of correction work.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to 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 01 Section "Summary of Work."
 2. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
 3. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 4. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 5. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. 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.
- E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- F. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- H. 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; manage fire-prevention program.
1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 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.

3.6 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 3. Indicate methods to be used to avoid trapping water in finished work.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
1. Protect porous materials from water damage.
 2. Protect stored and installed material from flowing or standing water.
 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 4. Remove standing water from decks.
 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard and replace stored or installed material that begins to grow mold.
 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for **48** hours are considered defective and require replacing.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for **48** hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within **48** hours.

3.7 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. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. 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 roads and paved areas not intended for or acceptable for integration into permanent construction. 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, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section "Closeout Procedures."

END OF SECTION 01 50 00

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SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements governing Contractor's selection of products for use in Project.
- B. Related Requirements:
 - 1. Division 01 Section "Submittal Procedures" specifies requirements for submittal of the Contractor's Construction Schedule and the Submittal Schedule.

1.3 DEFINITIONS

- A. Products: Items obtained 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.
- B. Definitions used in this Article are not intended to change meaning of other terms used in Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms such are self-explanatory and have well recognized meanings in construction industry.
 - a. 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.
 - b. 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.
 - c. Comparable Product: Product that is demonstrated and approved by Engineer through submittal process 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.
 - d. "Foreign Products," as distinguished from "domestic products," are items substantially manufactured (50% or more of value) outside of United States and its possessions; or produced or supplied by entities substantially

owned (more than 50%) by persons who are not citizens of nor living within United States and its possessions.

2. "Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form part of Work.
 3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.
- C. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.
- D. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications. Submit a comparable product request, if applicable.

1.4 ACTION SUBMITTALS

- A. Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify basis-of-design product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 2. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within seven days of receipt of a comparable product request. Engineer will notify Contractor approval or rejection of the comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Engineer's Approval of Submittal: As specified in Division 01, Section "Submittal Procedures."
 - b. Use product specified if Engineer does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01, 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, select product compatible with products previously selected, even if previously selected products were also options.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
 - 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.
 - 3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional identification requirements.
- C. Foreign Product Limitations: Except under 1 or more of following conditions, provide domestic products, not foreign products, for inclusion in the Work:
 - 1. No available domestic product complies with Contract Documents.
 - 2. Domestic products that comply with Contract Document are only available at prices or terms that are substantially higher than foreign products that also comply with Contract Documents.

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 and vandalism. 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 determine compliance with the Contract Documents and to determine 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. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. 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:** Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. **Special Warranty:** Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. **Special Warranties:** Prepare a written document that contains appropriate terms and identification, ready for 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 indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. **Submittal Time:** Comply with requirements in Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, 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 meeting requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Engineer will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
 - a. Submit additional documentation required by Engineer in order to establish equivalency of suggested products. Evaluation of "or equal" product status is by the Engineer, whose determination is final.
- B. Product Selection Procedures:
1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
 4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, which complies with requirements.
 5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that

complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.

6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, which complies with requirements.
7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated 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 requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
 - a. For approval of products by unnamed manufacturers, comply with requirements in Section "Substitution Procedures" for substitutions for convenience.
- C. Visual Matching Specification: Where Specifications require "match Engineer's sample," provide a product that complies with requirements and matches Engineer's sample. Engineer's decision will be final on whether a suggested product matches.
 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section "Substitution Procedures" for bid of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Engineer from manufacturer's full range" or similar phrase, select a product that complies with requirements. Engineer will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Engineer will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Engineer may return requests without action, except to record noncompliance with these requirements:
 1. Evidence that requested product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of requested product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
 2. Evidence that requested product provides specified warranty.

3. List of similar installations for completed projects with project names and addresses and names and addresses of Engineers and owners, if requested.
 4. Samples, if requested.
- B. Submittal Requirements: Approval by the Engineer of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS:

- A. Comply with manufacturer's instructions and recommendations for installation of products in applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01 60 00

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SECTION 01 73 00 – EXECUTION, CUTTING AND PATCHING, WARRANTIES

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. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
- B. Related Requirements:
 - 1. Division 01 "Summary of Work" for limits on use of Project site.
 - 2. Division 01 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 3. Division 01 Section "Submittal Procedures" for submitting surveys.
 - 4. Division 01 Section "Execution" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
 - 5. Division 01 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.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 PREINSTALLATION MEETINGS

- A. Cutting and Patching Conference: Conduct conference at Project site.
1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
 - a. Contractor's superintendent.
 - b. Trade supervisor responsible for cutting operations.
 - c. Trade supervisor(s) responsible for patching of each type of substrate.
 - d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affecting by cutting and patching operations.
 2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Engineers and owners, and other information specified.
- B. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 4. Dates: Indicate when cutting and patching will be performed.
 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

- E. Certified Surveys: Submit two copies signed by professional engineer.
- F. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.6 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Engineer of locations and details of cutting and await directions from Engineer before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 - 2. 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. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Plumbing piping systems.
 - f. Mechanical systems piping and ducts.
 - g. Control systems.
 - h. Communication systems.
 - i. Fire-detection and -alarm systems.
 - j. Conveying systems.
 - k. Electrical wiring systems.
 - l. Operating systems of special construction.
 - 3. Other Construction Elements: Do not cut and patch other construction elements or 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. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.

- g. Noise- and vibration-control elements and systems.
- 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
 - 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.
- B. In-Place Materials: Use materials for patching 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 provide a match acceptable to Engineer for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, 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; underground electrical services; and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, 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. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
1. Description of the Work.
 2. List of detrimental conditions, including substrates.
 3. List of unacceptable installation tolerances.
 4. Recommended corrections.
- D. 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 caused by differing field conditions outside the control of Contractor, submit a request for information to Engineer according to requirements in Division 01, Section "Project Management and Coordination."

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 Engineer promptly.

- B. General: Engage a professional engineer 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 limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Engineer when deviations from required lines and levels exceed allowable tolerances.
 - 7. 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 rim 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 Engineer. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Engineer 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.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by professional engineer, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

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.
 4. Maintain minimum headroom clearance of 8 feet in occupied and unoccupied spaces.
- 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: Where possible, select tools or equipment that minimize production of excessive noise levels

- F. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Engineer.
 - 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.
- G. 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.
- H. Repair or remove and replace damaged, defective, or nonconforming Work.
 - 1. Comply with Section "Closeout Procedures" for repairing or removing and replacing defective Work.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, 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. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. 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.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Division 01, Section "Summary of Work."
- F. 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 minimize interruption to occupied areas.

- G. 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 planned 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 neatly to minimum 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 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.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical 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 minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features 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, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends 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 condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction forces.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.

2. Preinstallation Conferences: Include Owner's construction forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

3.8 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 (27 deg C).

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: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
 - 1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.
- H. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01, Section "Temporary Facilities and Controls."
- I. 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.
- J. 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.
- K. 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.

3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Section "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Control."

3.10 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. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 73 00

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SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Closeout requirements for specific construction activities are included in appropriate Sections in Divisions 02 through 14, 21-27, and 31-33.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at final completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Engineer. Label with manufacturer's name and model number.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Engineer's signature for receipt of submittals.
 5. Submit testing, adjusting, and balancing records.
 6. Submit sustainable design submittals not previously submitted.
 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Division 01 Section "Demonstration and Training."
 6. Advise Owner of changeover in utility services.

7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements.
 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer 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 Engineer, that must be completed or corrected before certificate will be issued.
1. 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.

1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Division 01, Section "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
 5. Submit final completion photographic documentation.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer 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. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - a. Engineer will provide one repeat inspection under its contract with Owner. Subsequent inspections shall be at Contractor's expense.

- b. Upon completion of reinspection, Engineer 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.
- c. If necessary, reinspection will be repeated.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization 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.
 1. Organize list of spaces in sequential order 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 Engineer.
 - d. Name of Contractor.
 - e. Page number.
 4. Submit list of incomplete items in the following format:
 - a. PDF electronic file. Engineer will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Engineer for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- 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 Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
 1. Submit by email to Engineer.

PART 2 - PRODUCTS (NOT APPLICABLE).

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.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform 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 designated 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 not planted, mulched, or 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; clean according to manufacturer's recommendations 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. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - 1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.
 - p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - q. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Division 01 Section "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
- 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.

- a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 77 00

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SECTION 017839 - 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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. 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 Requirements:
 - 1. Section "Closeout Procedures" for general closeout procedures.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints and one file prints.
 - 2) Engineer will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints and three sets of prints.
 - 2) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.
- E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.4 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 1. Preparation: Mark record prints to show the actual installation and unit quantity where installation varies from that shown originally. Required individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding 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 acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding photographic documentation.
 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. Actual equipment locations.
 - d. Changes made by Change Order or Construction Change Directive.
 - e. Changes made following Engineer's written orders.
 - f. Details not on the original Contract Drawings.
 - g. Field records for variable and concealed conditions.
 - h. Record information on the Work that is shown only schematically.
 - i. Actual location and quantity of unit price items of the Work.
 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.

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 Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Engineer. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Annotated PDF electronic file with comment function enabled.
 2. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.
 3. Refer instances of uncertainty to Engineer for resolution.
 4. Engineer will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
 - a. See Section 013100 "Project Management and Coordination" for requirements related to use of Engineer's digital data files.
 5. Engineer will provide data file layer information. Record markups in separate layers.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Engineer.
 - e. Name of Contractor.

1.5 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 Drawings, and record Product Data and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file.

1.6 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. 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, and Product Data where applicable.

C. Format: Submit record Product Data as annotated PDF electronic file.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.7 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.

B. Format: Submit miscellaneous record submittals as PDF electronic file.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 017839

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SECTION 02 51 30 - GENERAL CONCRETE SURFACE PREPARATION

PART 1 - GENERAL

1.1 DEFINITIONS

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

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 02 51 30

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SECTION 02 51 40 - SURFACE PREPARATION FOR PATCHING AND OVERLAY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 REFERENCES

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

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 INSPECTION

- A. Floor Slabs:
 - 1. Floor slab delaminations: locate by sounding surface with hammer, rod, or chain drag.
 - 2. When delaminated area is struck, distinct hollow sound is heard.
 - 3. Contractor: sound all designated floors for delaminations.

4. Certain structural systems that contain thin slab thicknesses with Welded Wire Reinforcement or other small diameter reinforcing, such as waffle slab or precast tees, may have significant deterioration without evidence of delaminations. These structural systems require qualified personnel to provide additional inspections, primarily visual in nature, to define the extent of deterioration.
 5. Contractor: Visually inspect thin slab thicknesses with small diameter reinforcing for deterioration.
- B. Vertical and Overhead Surfaces:
1. Vertical and overhead surface delaminations: locate by sounding appropriate member with hammer or rod.
 2. Cracks, usually horizontal in orientation along beam faces, and vertical in orientation near column corners are indicators of delaminated concrete.
 3. Contractor: sound only vertical and overhead surfaces that show evidence of cracking and/or salt and water staining.
- C. Delaminated areas, once located by Contractor, shall be further sounded to define limits. Mark limits with chalk or paint.
- D. Contractor: locate spalls by visual inspection and mark boundaries with chalk or paint after sounding surface.
- E. Engineer/Architect will define and mark additional unsound concrete areas for removal, if required.
- F. Areas to be removed shall be as straight and rectangular as practical to encompass repair and provide neat patch.
- G. Contractor: Locate and determine depth of all embedded REINFORCEMENT, POST-TENSIONING TENDONS, and ELECTRICAL CONDUIT in repair area and mark these locations for reference during concrete removal. Do **NOT** nick or cut any embeds unless approved by Engineer/Architect.
- H. For overlay installation, boundaries of overlay areas will be as defined in project drawings and verified by Engineer/Architect.

3.2 PREPARATION

- A. Temporary shoring may be required at concrete floor repair areas exceeding 5 sq ft and at any beam, joist, or column repair. Contractor: Review all marked removal and preparation areas and request clarification by Engineer/Architect of shoring requirements in questionable areas. Shores shall be in place prior to concrete removal and cavity preparation in any area requiring shores.
- B. Delaminated, spalled and unsound concrete floor areas: mark boundaries. All concrete shall be removed from within marked boundary to minimum depth of 0.75 in. using 15 to 30 lb chipping hammers equipped with chisel point bits. When directed by Engineer/Architect, chipping hammers less than 15 lb shall be used to minimize

damage to sound concrete. Near vertical chipped edge shall be provided along perimeter of repair area where shown on drawings. Areas to be removed shall encompass repair and provide uniform cavity surface. If delaminations exist beyond minimum removal depth, chipping shall continue until all unsound and delaminated concrete has been removed from cavity.

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

3.3 INSPECTION OF REPAIR PREPARATION

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

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

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

3.4 REINFORCEMENT AND EMBEDDED MATERIALS IN REPAIR AREAS

- A. All embedded reinforcement exposed during surface preparation that has lost more than 50% (25% if 2 or more consecutive parallel bars and/or tendons are affected) of original cross-section due to corrosion shall be considered DEFECTIVE. All non-defective exposed reinforcement that has lost section to extent specified above as direct result of Contractor's removal operations shall be considered DAMAGED.
- B. Embedded materials including, but not limited to, electrical conduit, corrosion protection systems and snow/ice melting equipment shall be protected by Contractor during removal operations. Damage due to removal operations shall be repaired by Contractor in accordance with national code requirements at no cost to Owner. Embedded materials which are defective due to pre-existing conditions may be repaired or replaced by Contractor or abandoned at Owner's option and cost.
- C. Supplement defective or damaged embedded reinforcement by addition of reinforcement of equal diameter with Class "B" minimum splice per ACI 318 beyond damaged portion of reinforcement. Secure new reinforcement to existing reinforcement with wire ties and/or approved anchors. Supplemental reinforcement shall be ASTM A615 Grade 60 steel installed in accordance with Division 03 specification Sections. Tendon supplement or repair materials, when applicable, shall be as required by Section "Work Items."
- D. Loose and supplemental reinforcement exposed during surface preparation shall be securely anchored prior to concrete placement. Loose reinforcement shall be adequately secured by wire ties to bonded reinforcement or shall have drilled-in anchors installed to original concrete substrate. Drilled-in anchors shall be Powers "Tie-Wire Lok-Bolt" anchors, ITW Ramset/Red Head "TW-1400" anchor, or approved equivalent. Supplemental reinforcing needed to be held off substrate shall be adequately secured by drilled-in anchors installed to original concrete substrate with Powers "Tie-Wire Spike", ITW Ramset/Red Head Redi-Drive "TD4-112" anchors, or approved equivalent. Engineer/Architect will determine adequacy of wire ties and approve other anchoring devices prior to their use. Securing loose and supplemental reinforcement is incidental to surface preparation and no extras will be allowed for this Work.
- E. Concrete shall be removed to provide minimum of 3/4 in. clearance on all sides of defective or damaged exposed embedded reinforcement that is left in place. Minimum of 1.5-in. concrete cover shall be provided over all new and existing reinforcement. Concrete cover over reinforcement may be reduced to 1 in. with Engineer/Architect's approval if coated with an approved epoxy resin.

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

3.5 CLEANING OF REINFORCEMENT WITH DELAMINATION AND SPALL CAVITIES

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

3.6 PREPARATION OF CAVITY FOR PATCH PLACEMENT

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

END OF SECTION 02 51 40

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SECTION 033021 - CAST-IN-PLACE CONCRETE RESTORATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in-place concrete, including reinforcement, concrete materials, mix design, placement procedures, and finishes.
- B. Work in other Sections related to Cast-in-Place Concrete:
 - 1. Division 1 Section "Project Management and Coordination."
 - 2. Division 1 Section "Quality Control."
 - 3. Division 7 Section "Concrete Joint Sealants."

1.3 SUBMITTALS

- A. General: In addition to the following, comply with submittal requirements in ACI 301.
- B. Product Data: For each type of manufactured material and product indicated.
- C. Design Mixes: For each concrete mix.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
- C. Source Limitations: Obtain each type of cement of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- D. Comply with ACI 301, "Specification for Structural Concrete," including the following, unless modified by the requirements of the Contract Documents.
 - 1. General requirements, including submittals, quality assurance, acceptance of structure, and protection of in-place concrete.

2. Formwork and form accessories.
3. Steel reinforcement and supports.
4. Concrete mixtures.
5. Handling, placing, and constructing concrete.

PART 2 - PRODUCTS

2.1 FORMWORK

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

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Epoxy-coated Reinforcing Bars: ASTM A775
- C. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets, mats only. Roll stock prohibited.
- D. Epoxy-Coated Welded Wire Fabric: ASTM A884, fabricated from as-drawn steel wire into flat sheets, mats only. Roll stock prohibited.
- E. Provide bar supports according to CRSI's "Manual of Standard Practice." Use all-plast bar supports when in contact with exposed concrete surface.

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Types I or II or Type I/II.
- B. Fly Ash: ASTM C618, Class C or Class F.
- C. Ground-Granulated Blast Furnace Slag: ASTM C989, Gr. 100 or higher.
- D. Silica Fume: ASTM C1240.
- E. Normal-Weight Aggregate: ASTM C 33, uniformly graded, not exceeding **1-inch in** nominal size.
 1. Combine Aggregate Gradation: Well graded from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve, except that less than 8 percent may be retained on coarsest sieve and on No. 50 sieve, and less than 8 percent may be retained on sieves finer than No. 50.
- F. Lightweight Aggregates: ASTM C 330.
- G. Water: Potable and complying with ASTM C 1602.

2.4 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain no more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures. Do not use admixtures containing calcium chloride.
- B. General: Admixtures certified by manufacturer that all admixtures used are mutually compatible.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing or high-range water reducing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use high-range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, fiber reinforced concrete, and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 - 4. Use non-corrosive accelerator for all concrete, less than 8 inches thick, placed at air temperatures below 50 degrees Fahrenheit.
 - 5. Use high range water reducing admixture and viscosity modifying admixture, where required, in Self-Consolidating Concrete (SCC).
 - 6. Use corrosion-inhibiting admixture in parking structure slabs and other areas so noted on the drawings. The dosage shall be 3 gallons per cubic yard.
 - 7. Use shrinkage reducing/shrinkage compensating admixture where indicated on drawings to keep shrinkage below <<insert number>>.
 - 8. Use alkali-silica reactivity inhibitor unless ready mix company confirms that the aggregates to be used on the job are non-reactive.
- D. Normal Water-Reducing Admixture: ASTM C 494, Type A.
- E. Mid Range Water-Reducing Admixture: ASTM C 494, Type A.
- F. High-Range, Water-Reducing Admixture (Superplasticizer): ASTM C 494, Type F.
- G. High-Range Water-Reducing Admixture (Superplasticizer) for Self-Consolidating Concrete, ASTM C 494 Type F.
- H. Viscosity Modifying Admixture for Self-consolidating Concrete:
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Visctrol" or "Eucon ABS," Euclid Chemical Co.
 - b. "Rheomac VMA Series," BASF Construction Chemicals.
 - c. "Sika Stabilizer Series," Sika Corporation.
 - d. "AWA-C61," Russ Tech Admixtures, Inc.
 - e. "V-MAR," W.R. Grace & Co.
- I. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
- J. Air Entraining Admixture: ASTM C260.

- K. Non-Chloride, Non-Corrosive Water-Reducing, Accelerating Admixture: ASTM C 494, Type C or E.
1. Products: Subject to compliance with requirements, provide one of following:
 - a. "Eucon AcN-Series," "Accelguard 80," "Accelguard NCA," or "Accelguard 90," by Euclid Chemical Company.
 - b. "DCI," "PolaraSet," "Lubricon NCA," "Daraset" or "Gilco," by W.R. Grace & Co.
 - c. "Pozzutec 20+" or "Pozzolith NC 534," by BASF Construction Chemicals.
 - d. "Sika Set NC," "Plastocrete 161FL," or "Sika Rapid-1," by Sika Corporation.
 - e. "Catexol 2000 RHE," by Axim Concrete Technologies.
 - f. "Polychem NCA" or "Polychem Super Set," General Resource Technology.
 - g. "LCNC-166," Russ Tech Admixtures, Inc.
- L. Water-Reducing or Retarding Admixture: ASTM C 494, Type D or B.
1. Products: Subject to compliance with requirements, provide one of following:
 - a. "Eucon Retarder-75," "Eucon DS" or "Eucon W.O." Euclid Chemical Co.
 - b. "Daratard-17" or "Recover," W.R. Grace & Co.
 - c. "Pozzolith Series" or "Delvo Series," BASF Construction Chemicals.
 - d. "Sikatard Series," or "Plastiment Series" or "Plastocrete Series," Sika Corporation.
 - e. "Polychem R," General Resource Technology.
 - f. "LC-400 Series" or "LC-500 Series," Russ Tech Admixtures, Inc.
- M. Corrosion Inhibiting Admixture shall be capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Eucon CIA" or "Eucon BCN," Euclid Chemical Company.
 - b. "DCI" or "DCI-S," W.R. Grace.
 - c. "Rheocrete CNI," BASF Construction Chemicals.
 - d. "Sika CNI," Sika Corporation.
 - e. "Catexol 1000 CN-CI," Axim Concrete Technologies.
 - f. "Polychem CI," General Resource Technology.
 - g. "Russ Tech RCI," Russ Tech Admixtures, Inc.
 2. Add at rate of 3 gal/cu yd of concrete, which shall inhibit corrosion to 9.9 lb of chloride ions per cu. yd. of concrete. Calcium Nitrite based corrosion inhibitor shall have a concentration of 30 percent, plus or minus 2 percent of solids content.
- N. Shrinkage Compensating Admixture:
1. Design requires using materials with combined drying shrinkage characteristic of 0.04 percent maximum at 28 days. Concrete Mixture(s), using actual

aggregates, admixtures and cement of the mix for Project as detailed herein and in Drawings, shall meet criteria. Submit ASTM C 157 (may be modified by curing period duration) results for at least 3 specimens. Test takes 28 days minimum. Begin tests as soon as possible so final test results available for submittal to Engineer.

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

2.5 FIBER REINFORCEMENT

- A. Micro-Fiber: **Monofilament or fibrillated** polypropylene micro-fibers complying with ASTM C 1116, Type III, minimum 0.75 inches long.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Monofilament Micro-Fibers: Minimum dosage rate 1.0 pound per cubic yard of concrete.
 - 1) "Durafiber," Industrial Systems, Ltd.
 - 2) "Fibermesh 150," Propex Concrete Systems.
 - 3) "Fiberstrand 100," Euclid Chemical Co.
 - 4) "Grace Microfibers," W.R. Grace & Co., Inc.
 - 5) "MasterFiber M100," BASF Construction Chemicals.
 - 6) "Mighty-Mono," Forta Corp.
 - 7) "Polymesh," General Resource Technology.
 - 8) "Sika Fibers PPM," Sika Corporation.
 - b. Fibrillated Micro-Fibers: Minimum dosage rate 1.5 pounds per cubic yard of concrete.
 - 1) "Fibermesh 300," Propex Concrete Systems.
 - 2) "Grace Fibers," W.R. Grace & Co., Inc.
 - 3) "MasterFiber F100," BASF Construction Chemicals.
 - 4) "Sika Fibers PPF," Sika Corporation.

- B. Macro-Fiber: Polyolefin macro-fibers complying with ASTM C 1116, Type III, minimum 1.5 inches long, minimum tensile strength 73 ksi, minimum Modulus of Elasticity 620 ksi.

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

- a. "Forta Ferro," Forta Corp. Minimum dosage rate 5.0 pounds per cubic yard of concrete.
 - b. "Novomesh 950," Propex Concrete Systems. Minimum dosage rate 7.5 pounds per cubic yard of concrete.
 - c. "Strux 90/40 Structural Synthetic Fibers," W.R. Grace & Co., Inc. Minimum dosage rate at 3.5 pounds per cubic yard of concrete.
 - d. "Tuf-Strand SF," Euclid Chemical Co. Minimum dosage rate at 5.0 pounds per cubic yard of concrete.
2. Conform to ASTM C 1399 and have a minimal residual strength performance of level 3 at 2 mm of beam deflection.
- C. Do not change volume of water used in mix when fibers are used. Offset any slump loss due to addition of fibers by addition of superplasticizer.
- D. Conform to manufacturer's recommendations for quantity of fibers if higher than the minimum dosage rates.
- E. See Drawings for locations of allowable use.
- F. Fiber manufacturer or approved distributor: Provide services of qualified representative at pre-construction meeting, concrete pre-installation meeting and first concrete placement containing fibers.

2.6 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry. Materials must be free of harmful substances, such as sugar or fertilizer, or substances that may discolor the concrete. To remove soluble substances, burlap should be thoroughly rinsed in water before placing it on the concrete.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- F. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- G. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.7 CONCRETE MIXES

- A. Comply with ACI 301 requirements for concrete mixtures.
- B. Prepare design mixes, proportioned according to ACI 301, for **normal-weight** concrete determined by either laboratory trial mix or field test data bases, as follows:
 - 1. Compressive Strength (28 Days): **5000 psi (34.5 MPa)**.
 - 2. Maximum w/cm ratio: See Drawing Notes.
 - 3. Air Content: See Drawing Notes.
 - 4. Maximum Permissible Cementitious Material Content:
 - a. Fly Ash: 25 per cent
 - b. Slag: 50 per cent
 - c. Silica Fume: 10 per cent
 - d. Fly Ash plus Slag plus Silica Fume: 50 per cent
 - e. Fly Ash plus Silica Fume: 35 per cent
 - 5. Slump: 4 inches (100 mm).
 - a. Slump Limit for Concrete Containing High-Range Water-Reducing Admixture: Not more than 8 inches (200 mm) after adding admixture to plant- or site-verified, 2- to 3-inch (50- to 75-mm) slump.
 - 6. Slump Flow: Per ASTM C1611. Non-segregating, between 24 and 28 inches flow. Workability, pumpability, finishability, and setting time of the mix design shall be verified with a successful test placement onsite.
 - 7. Density per ASTM C567: **115 lbs/ft³**

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with ASTM C 94 and ASTM C 1116.
 - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
 - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

2.9 MATERIAL ACCESSORIES

- A. Extended Open Time Epoxy Bonding Agent: Three component, water based, epoxy modified portland cement bonding agent and corrosion inhibitor coating providing the recommended Manufacturer's open time in which to apply repair mortar. Product shall be capable of achieving bond strength of 2,700 psi per ASTM C 882.
1. Acceptable materials for this Work are:
 - a. "Duralprep A.C." by The Euclid Chemical Company, Cleveland, OH.
 - b. "Sika Armatec 110 EpoCem", by Sika Corporation, Lyndhurst, NJ.
- B. Epoxy Adhesive: 2 or 3 component, 100 percent solids, 100 percent reactive compound suitable for use on dry or damp surfaces. Product shall be capable of achieving bond strength of 1,800 psi per ASTM C 882.
1. Acceptable materials for this Work are:
 - a. "MasterEmaco P 124" or "MasterEmaco ADH 326," by BASF Construction Chemicals, Shakopee, MN.
 - b. "Kemko 001 or 008", by ChemCo Systems, Inc., Redwood City, CA.
 - c. "Euco #452 Epoxy Series," or "Duralcrete Epoxy Series", by The Euclid Chemical Company, Cleveland, OH.
 - d. Sikadur 32 Hi-Mod LPL", by Sika Corporation, Lyndhurst, NJ.
- C. Joint Fillers
1. Joint filler in slabs and curbs per ASTM D1751 Asphalt impregnated fiber board; as shown on Drawings. Acceptable products as follows:
 - a. "Flexcell," Knight-Celotex Corp.
 - b. "Fibre Expansion Joint," W.R. Meadows, Inc.
 2. Joint filler used vertically to isolate walls from columns or other walls: White molded polystyrene beadboard type.
 3. Joint cover used to bridge gap between columns and grade walls, retaining walls, or basement walls: Minimum width: Gap width plus 4 in. For gaps over 3 in. wide, protect cover with protection board sized to span gap satisfactorily. Acceptable products:
 - a. "Sealtight Premoulded Membrane Vapor Seal," W.R. Meadows, Inc., Elgin, Illinois.
 - b. "Sealtight Melgard," W.R. Meadows, Inc., Elgin, Illinois and shall be applied according to manufacturer's instructions.

2.10 TOOLS

- A. Slab Jointing
1. Concrete groovers: For tooled joints in concrete:

- a. For concrete not exceeding 4 in. thickness, use groover with 1 in. deep v-cut bit, 0.5 in. surface width and 3/16 in. to 1/4 in. edge radius.
 - b. For concrete exceeding 4 in. thickness, use groover with 1.5 in. deep v-cut bit, 0.5 in. surface width and 3/16 in. to 1/4 in. edge radius.
2. Saw Cut Joints:
- a. Acceptable tool: "Soff-Cut Saw Model 310" or "Model G2000," Soff-Cut International, Corona, CA.
 - 1) Cut joint as soon as concrete will support weight of operator and saw without deforming.
 - 2) Joint shall be 1 in. deep for concrete thickness of 4 in. or less. Joint shall be 1.5 in. deep for concrete exceeding 4 in. thickness. Do not cut reinforcement.
 - 3) Extend joint to adjacent vertical surface within 30 minutes of cutting.
 - 4) Retool or grind sawcut joint before installing sealant to provide equivalent dimensions, shape and volume as joint obtained by tooled joint. Surface width shall be 0.5 in. with 3/16 to 1/4 in. edge radius.
- B. All joints subject to acceptance by sealant installer. Concrete contractor to rework rejected joints until acceptable to sealant installer.

PART 3 - EXECUTION

3.1 PRECONSTRUCTION MEETING

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

3.2 FORMWORK

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

3.3 STEEL REINFORCEMENT

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

3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Locate and install so as not to impair strength or appearance of concrete, at locations indicated or as approved by Engineer.

- C. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint filler full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

3.5 CONCRETE PLACEMENT

- A. Comply with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.
- B. Do not add water to concrete during delivery, at Project site, or during placement.
- C. Consolidate concrete with mechanical vibrating equipment.

3.6 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch (6 mm) in height rubbed down or chipped off.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.7 FINISHING NON-FORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on the surface.
 - 1. Do not further disturb surfaces before starting finishing operations.
- C. Nonslip Broom Finish: Apply a nonslip broom finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.8 TOLERANCES

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

3.9 CONCRETE PROTECTION AND CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305R for hot-weather protection during placement. Keep concrete continually moist prior to final curing by evaporation retarder, misting, sprinkling, or using absorptive mat or fabric covering kept continually moist.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.1 lb/sq. ft. x h before and during finishing operations. Apply material according to manufacturer's written instructions one or more times after placement, screeding and bull floating concrete, but prior to float finishing. Repeated applications are prohibited after float finishing has begun.
 - 1. Acceptable evaporation retarder materials for this Work are:
 - a. "Cimfilm", by Axim Concrete Technologies.
 - b. "MasterKure ER 50," by BASF Construction Chemicals, Shakopee, MN.
 - c. "Aquafilm", by Conspec Marketing & Manufacturing Co., Inc.
 - d. "Sure-Film (J-74)", by Dayton Superior Corporation.
 - e. "Eucobar", or "Tamms Surface Retarder", by The Euclid Chemical Company, Cleveland, OH.
 - f. "E-Con", by L&M Construction Chemicals, Inc.
 - g. "EVRT", by Russ Tech Admixtures, Inc.
 - h. "SikaFilm", by Sika Corporation, Lyndhurst, NJ.
- C. Immediate upon conclusion of finishing operation cure concrete in accordance with ACI 308 for duration of at least seven days by moisture curing or moisture retaining covering. **Dissipating curing compounds complying with ASTM C309 may be used in accordance with recommendations of ACI 506.7, "Specification for Concrete."** Provide additional curing immediately following initial curing and before concrete has dried.
 - 1. Continue method used in initial curing.
 - 2. Material conforming to ASTM C171.
 - 3. Other moisture retaining covering as approved by Engineer/Architect.
 - 4. During initial and final curing periods maintain concrete above 50°.
 - 5. Prevent rapid drying at end of curing period.
- D. Concrete surfaces to receive slab coatings or penetrating sealers shall be cured with moisture curing or moisture-retaining cover. **Concrete surfaces may be cured by sealer/coating manufacturer recommended dissipating resin curing compound, complying with ASTM C309 and in accordance with ACI 506.7.**

- E. Dissipating Curing Compound [(VOC Compliant, less than 350 g/l)]: Comply with ASTM C 309, Type 1, Class A or B. Moisture loss shall be not more than 0.55 kg/m² when applied at 200 sq. ft/gal. Manufacturer's certification is required. Silicate based compounds are prohibited.
1. Subject to project requirements provide one of the following products:
 - a. "Kurez DR VOX" or "Kurez RC," or "Kurez RC Off," The Euclid Chemical Company.
 - b. "RxCure WB," or "RxCure VOC" or "W.B. Cure VOC," Conspec Marketing & Manufacturing.
 - c. "MasterKure CC 200 WB" or "MasterKure CC 160 WB," BASF Construction Chemicals.
 2. Additional requirements:
 - a. With product submittal provide plan and procedures for removal of residual curing compound prior to application of sealers, coatings, stains, pavement markings and other finishes.
 - b. Provide a summary of testing to show adequate surface preparation for successful application of sealers, coatings, stains, pavement markings, and other finishes.
- F. Curing Methods: Cure formed and non-formed concrete moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: **Contractor** shall engage a qualified independent testing and inspecting agency acceptable to the Engineer to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article. Perform tests according to ACI 301.

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
2. Determine strength at **3, 7, and 28** days. Each test shall consist of two 6-inch diameter cylinders or three 4-inch diameter cylinders. Testing shall be in accordance with ASTM C39.

3.11 EVALUATION AND ACCEPTANCE OF WORK

A. Acceptance of Repairs (ACI 301):

1. Acceptance of completed concrete Work will be according to provisions of ACI 301.
2. Repair areas shall be sounded by Engineer and Contractor with hammer or rod after curing for 72 hours. Contractor shall repair all hollowness detected by removing and replacing patch or affected area at no extra cost to Owner.
3. If shrinkage cracks appear in repair area when initial curing period is completed, repair shall be considered defective, and it shall be removed and replaced by Contractor at no extra cost.

END OF SECTION 033021

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SECTION 03 37 50 - LATEX MODIFIED CONCRETE AND MORTAR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the provision of all labor, materials, and equipment necessary for production and installation of latex modified concrete or mortar for patching floor spalls and overlays.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Submittal Procedures."
 - 2. Division 02 Section "General Concrete Surface Preparation."
 - 3. Division 02 Section "Surface Preparation for Patching and Overlay."
 - 4. Division 03 Section "Cast-in-Place Concrete - Restoration."
 - 5. Division 07 Section "Concrete Joint Sealants".

1.3 QUALITY ASSURANCE

- A. Work shall conform to requirements of ACI 301 and ACI 318 except where more stringent requirements are shown on Drawings or specified in this Section.
- B. Testing Agency:
 - 1. Independent testing laboratory employed by Contractor and acceptable to Engineer/Architect.
 - 2. Accredited by AASHTO under ASTM C1077. Testing laboratory shall submit documented proof of ability to perform required tests.
- C. Sampling and testing of concrete and mortar shall be performed by ACI certified Concrete Field Technicians Grade I. Certification shall be no more than 3 years old.
- D. Testing Agency is responsible for conducting, monitoring and reporting results of all tests required under this Section. Testing Agency has authority to reject concrete or mortar not meeting Specifications.
- E. Proportioning, production, placement and finishing of latex modified concrete or mortar shall be overseen by, and have approval of, latex manufacturer. Latex admixture supplier shall make available qualified individual experienced in placement of latex modified concrete overlays, to aid Contractor during placement of all latex modified

concrete overlay. Qualification of supplier's representative shall be acceptable to Engineer/Architect.

- F. Contractor shall have at least three years previous experience installing latex modified concrete overlays and shall have performed minimum of three projects of similar nature of at least 50,000 sq. ft. in size.
- G. Testing Agency shall submit following information for field testing of concrete unless modified in writing by Engineer/Architect:
1. Project name and location.
 2. Contractor's name.
 3. Testing Agency's name, address and phone number.
 4. Concrete supplier.
 5. Date of report.
 6. Testing Agency technician's name (sampling and testing).
 7. Placement location within structure.
 8. Concrete mix data (quantity and type):
 - a. Cement.
 - b. Fine aggregates.
 - c. Coarse aggregates.
 - d. Water.
 - e. Water/cement ratio.
 - f. Latex emulsion.
 - g. Latex emulsion per cu yd of concrete.
 - h. Other admixtures.
 9. Weather data:
 - a. Air temperatures.
 - b. Weather.
 - c. Wind speed.
 10. Field test data:
 - a. Date, time and place of test.
 - b. Slump.
 - c. Air content.
 - d. Unit weight.
 - e. Concrete temperature.
 11. Compressive test data:
 - a. Cylinder number.
 - b. Age of concrete when tested.
 - c. Date and time of cylinder test.
 - d. Curing time (field and lab).
 - e. Compressive strength.
 - f. Type of break.

1.4 REFERENCES

A. American Concrete Institute (ACI):

1. ACI 214, "Recommended Practice for Evaluation of Strength Test Results of Concrete."
2. ACI 301, "Standard Specifications for Structural Concrete ."
3. ACI 302.1R, "Guide for Concrete Floor and Slab Construction."
4. ACI 305R, "Hot Weather Concreting."
5. ACI 306R, "Cold Weather Concreting."
6. ACI 306.1, "Standard Specification for Cold Weather Concreting."
7. ACI 318, "Building Code Requirements for Reinforced Concrete."
8. ACI 347, "Recommended Practice for Concrete Formwork."

B. American Society for Testing and Materials (ASTM):

1. ASTM C31, "Method of Making and Curing Concrete Test Specimens in the Field."
2. ASTM C33, "Specification for Concrete Aggregates."
3. ASTM C39, "Test Method for Compressive Strength of Cylindrical Concrete Specimens."
4. ASTM C94, "Specification for Ready-Mixed Concrete."
5. ASTM C109, "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)."
6. ASTM C138, "Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete."
7. ASTM C143, "Test Method for Slump of Portland Cement Concrete."
8. ASTM C150, "Specification for Portland Cement."
9. ASTM C172, "Method of Sampling Freshly Mixed Concrete."
10. ASTM C173, "Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method."
11. ASTM C231, "Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method."
12. ASTM C260, "Specification for Air-Entraining Admixtures for Concrete."
13. ASTM C494, "Specification for Chemical Admixtures for Concrete."
14. ASTM C685, "Specification for Concrete Made by Volumetric Batching and Continuous Mixing."
15. ASTM C1040, "Standard Test Method for Density of Unhardened and Hardened Concrete by Nuclear Methods."
16. ASTM C1077, "Standard Practice for Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation."
17. ASTM C1218, "Sampling and Testing for Water Soluble Chloride Ion in Concrete and Concrete Raw Materials."

C. Concrete Reinforcing Steel Institute (CRSI):

1. CRSI MSP, "Manual of Standard Practice."

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

1. ACI SP-15, "Standard Specifications for Structural Concrete ACI 301 with selected ACI and ASTM References."
2. ACI 302.1R, "Guide for Concrete Floor and Slab Construction."
3. ACI 305R, "Hot Weather Concreting."
4. ACI 306R, "Cold Weather Concreting."
5. ACI 306.1, "Standard Specification for Cold Weather Concreting."

1.5 SUBMITTALS

- A. Make submittals in accordance with requirements of Division 01 of this Specification, and as herein specified.
- B. Contractor shall submit concrete mix design reviewed and approved by latex manufacturer to Engineer/Architect 2 weeks prior to placing concrete. Use mix design submittal form included at end of this Section. Proportion mix designs as defined in ACI 301, 4.2.3. Include following information for each concrete mix design:
 1. Method used to determine mix design (per ACI 301, 4.2.3).
 2. Gradation of fine and coarse aggregates: ASTM C33.
 3. Proportions of all ingredients including all admixtures added either at time of batching or at job site.
 4. Water-cement ratio.
 5. Slump: ASTM C143.
 6. Certification of chloride content of admixtures.
 7. Air content of freshly mixed concrete by pressure method, ASTM C231.
 8. Unit weight of concrete: ASTM C138.
 9. Strength at 3 and 28 days.
 10. Water soluble chloride ion content of concrete per ASTM C1218.
- C. Contractor: At pre-concrete meeting, submit procedures to protect fresh concrete from rain and hot and cold weather conditions.
- D. Testing Agency: Promptly report all concrete test results to Engineer/Architect, Contractor and concrete supplier. Include following information:
 1. See Article "Quality Assurance," paragraph "Testing Agency shall submit...."
 2. Weight of concrete, ASTM C138.
 3. Slump, ASTM C143.
 4. Air content of freshly mixed concrete by pressure method, ASTM C231 or volumetric method, ASTM C173.
 5. Concrete temperature (at placement time).
 6. Air temperature (at placement time).
 7. Strength determined in accordance with ASTM C39.
- E. Concrete batched on-site shall be placed and finished within 30 minutes of adding water to mixture.
- F. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.

- G. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aggregates (ACI 301, Article 4.2.1):
1. Normal weight concrete aggregates:
 - a. Coarse aggregate: Crushed and graded limestone or approved equivalent conforming to ASTM C33, Class Designation 5S.
 - b. Fine aggregate: Natural sand conforming to ASTM C33 and having preferred grading shown for normal weight aggregate in ACI 302.1R, Table 4.2.1.
 2. Coarse aggregate: Nominal sizes indicated below, conforming to ASTM C33, Table 2:
 - a. 0.375 in. for patch cavities 0.75 to 1.5 in. deep.
 - b. 0.5 in. for patch cavities greater than 1.5 in. deep and overlay work. For overlays limit maximum size of aggregates to one-third nominal thickness of overlay.
 3. Chloride Ion Level: Chloride ion content of aggregates shall be tested by laboratory making trial mixes. Also, total water soluble chloride ion content of mix including all constituents shall not exceed 0.06% chloride ions by weight of cement for prestressed concrete, and 0.15% chloride ions by weight of cement for reinforced concrete. Test to determine chloride ion content shall conform to Test Method ASTM C1218.
- B. Cement (ACI 301, 4.2.1.1):
1. Portland cement, Type I, ASTM C150. Use 1 cement clinker source throughout project. No change in brand without prior written approval from Engineer/Architect.
- C. Water (ACI 301, 4.2.1.3):
1. ASTM C94.
- D. Latex Emulsion:
1. "Dow Reichhold Modifier A/NA, Dow Reichhold Specialty Latex LLC, Research Triangle Park, N.C.
 2. "Styrofan 1186," BASF Corporation, Chattanooga, TN.
 3. Or Engineer approved equal submitted prior to bidding.

- E. Admixtures (ACI 301, 4.2.1.4):
1. Only admixtures listed shall be acceptable. Do not submit alternates.
 2. Concrete supplier and manufacturer shall certify compatibility of all ingredients in each mix design.
 3. Use admixtures in strict accordance with manufacturer's recommendations.
 4. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.5% chloride ions, by weight of admixture, are not permitted. Additionally, each admixture shall not contribute more than 5 ppm, by weight, of chloride ions to total concrete constituents.
- F. Storage of Materials (ACI 301, 4.1.4).

2.2 CONCRETE MIX DESIGN

- A. Selection of concrete proportions shall be in accordance with ACI 301, 4.2.3.1. Before any concrete is placed for project, Contractor shall submit to Engineer/Architect data showing method used for determining concrete mix design, including fine and coarse aggregate gradations, proportions of all ingredients, water-cement ratio, slump, air content, cylinder breaks and other required data specified in Article "Submittals," second para, for each different concrete type specified. Mix design shall meet following minimum requirements:

Compressive Strength	4500 psi @ 28 days (2500 psi @ 3 days)
Water-Cement Ratio	0.25 to 0.40
Latex Content Per Sack of Cement	3.5 gal.
Slump*	4 in. ± 2 in.
Cement Content	658-800 lb./c.y.
Air Content	Less than 6.5%

*For concrete placed by vibratory screeds, slump shall not exceed 4 in. at point of deposit.

- B. Chloride Ion Level: See Article "Materials," paragraph "Chloride Ion Level."
- C. Bonding Grout: Bonding grout shall consist of sand, cement, and latex emulsion in proportions similar to mortar in concrete with sufficient water to form stiff slurry to achieve consistency of "pancake batter."

PART 3 - EXECUTION

3.1 PRODUCTION OF MORTAR OR CONCRETE

- A. Production of latex modified mortar or concrete shall be in accordance with requirements of ACI 301, 4.3.1, except as otherwise specified herein.

- B. Concrete or mortar, mixed at site, shall be proportioned by continuous mixer used in conjunction with volumetric proportioning. Volumetric batching/continuous mixers shall conform to ASTM C685. In addition, self-contained, mobile, continuous type mixing equipment shall comply with following:
1. Mixer shall be capable of producing batches of not less than 6 cu yds.
 2. Mixer shall be capable of positive measurement of cement being introduced into mix. Recording meter visible at all times and equipped with ticket printout shall indicate this quantity.
 3. Mixer shall provide positive control of flow of water into mixing chamber. Water flow shall be indicated by flowmeter and shall be readily adjustable to provide for minor variations in aggregate moisture.
 4. Mixer shall be capable of being calibrated to automatically proportion and blend all components of indicated composition on continuous or intermittent basis, as required by finishing operation, and shall discharge mixed material through conventional chute into transporting device or directly in front of finishing machine. Sufficient mixing capacity of mixers shall be provided to permit intended pour to be placed without interruption.
 5. Mixer shall be calibrated to accurately proportion specified mix. Yield is required to be within tolerance of 1.0 %.
- C. On-site mortar or concrete batching in mixer of at least 0.125 cu yd capacity shall be permitted only with approval of Engineer/Architect. On-site concrete batching and mixing shall comply with requirements of ACI 301, 4.3.1.

3.2 PREPARATION (ACI 301, 5.3.1)

- A. Cavity surfaces shall be clean and dry prior to commencement of patch or overlay installation. Preparation of surfaces to receive new concrete shall be in accordance with Section "Surface Preparation for Patching and Overlay."
- B. Bonding Grout:
1. Bonding grout shall be applied to damp (but not saturated) concrete surface in uniform thickness of 0.0625 in. to 0.125 in. over all surfaces to receive patching or overlay.
 2. Grout shall not be allowed to dry or dust prior to placement of patch or overlay material. If concrete placement is delayed and the coating dries, cavity or surface shall not be patched or overlaid until it has been recleaned and prepared as specified in Section "Surface Preparation for Patching and Overlay." Grout shall not be applied to more area than can be patched or overlaid within 0.5 hr by available manpower.
- C. Receive Owner's and Engineer/Architect's written approval of concrete surface finish used on flatwork before beginning of construction.

3.3 INSTALLATION

A. Placing (ACI 301, 5.3.2):

1. Do not place concrete when temperature of surrounding patch area or air is less than 50° F. unless following conditions are met:
 - a. Place concrete only when temperature of surrounding air is expected to be above 45° F. for at least 36 hours.
 - b. When above conditions are not met, concrete may be placed only if insulation or heating enclosures are provided in accordance with ACI 306, "Recommended Practice for Cold Weather Concreting." Submit measures in writing for Engineer/Architect's review prior to concrete placement.
 - c. Cost for precautionary measures required shall be borne by Contractor.
2. Concrete shall be manipulated and struck off slightly above final grade. Concrete shall then be consolidated and finished to final grade with internal and surface vibration devices. Contractor's preferred consolidation method shall be submitted for Engineer/Architect's review prior to concrete placement.
 - a. Do not place concrete if mix temperature exceeds 85° F.
 - b. Do not place concrete under hot weather conditions. Hot weather is defined as air temperature which exceeds 80° F. or any combination of high temperature, low humidity and high wind velocity which causes evaporation rates in excess of 0.10 psf per hr as determined by ACI 305R, Figure 2.1.5.
3. Fresh concrete 3 in. or more in thickness shall be vibrated internally in addition to surface vibration.
4. Concrete shall be deposited as close to its final position as possible. All concrete shall be placed in continuous operation and terminated only at bulkheads or designated control or construction joints.
5. On ramps with greater than 5 % slope, all concreting shall begin at low point and end at high point. Contractor shall make any necessary adjustment to slump or equipment to provide wearing surface without any irregularities or roughness.

B. Finishing (ACI 301, 5.3):

1. Flatwork (BROOM Finish, 5.3.4.2.d):
 - a. When tight and uniform concrete surface has been achieved by screeding and finishing operation, give slab surface coarse transverse scored texture by drawing broom across surface. Texture shall be accepted by Owner and Engineer/Architect from sample panels.
 - b. Finishing tolerance: ACI 301, 5.3.4.2; Class B tolerance.
 - c. Finish all concrete surfaces to proper elevations to insure that all surface moisture will drain freely to floor drains, and that no puddle areas exist. Contractor shall bear cost of any corrections to provide for positive drainage.

C. Joints in Concrete (ACI 301, 2.2.2.5):

1. Construction, control and isolation joints are located and detailed on Drawings:

- a. Tool joints at time of finishing. Sawcut joints are prohibited.
- b. Isolation joints - interrupt structural continuity resulting from bond, reinforcement or keyway.
- c. Coordinate configuration of tooled joints with control joint sealants.

D. Curing:

1. Latex modified mortar and concrete shall be cured according to latex manufacturer's recommendations and according to following minimum requirements:
 - a. Surface shall be covered with single layer of clean, wet burlap as soon as surface will support it without deformation. Cover burlap with continuous single thickness of polyethylene film for 24 hours.
 - b. After 24 hours remove polyethylene film and allow burlap to dry slowly for an additional 24 to 48 hours.
 - c. Remove burlap and allow concrete to air dry for an additional 48 hours.
 - d. Curing time shall be extended, as Engineer/Architect directs, when curing temperature falls below 50° F.

E. Repair of Defects (ACI 301, 5.3.7):

1. Repair all surface defects exceeding 0.25 in. width or depth.
2. Match color of concrete to be repaired.
3. Submit samples of materials and relevant literature and test data on proprietary compounds and procedures used for adhesion or patching ingredients to Engineer/Architect for its review before patching concrete.
4. Receive written approval of Engineer/Architect of method and materials prior to making repairs to concrete.

3.4 FIELD QUALITY CONTROL BY TESTING AGENCY (ACI 301, 1.6)

A. Air Content:

1. Sample freshly-mixed concrete per ASTM C172 and conduct 1 air content test per ASTM C231 or ASTM C173 for each 10 cu yds of concrete placed or each day's production, whichever is less.

B. Concrete Compressive Strength:

1. Mold test cylinders in accordance with ASTM C31 and test in accordance with ASTM C31 as follows:
 - a. Take minimum of 6 cylinders for each 25 cu yds or fraction thereof, of each mix design of concrete placed in any 1 day. Use of 4 in. x 8 in. cylinders in lieu of standard cylinders is acceptable.
 - b. Additional 2 cylinders shall be taken and field cured under conditions of cold weather concreting, and when directed by Engineer/Architect.

2. Cover specimens properly, immediately after finishing. Protect outside surfaces of cardboard molds, if used, from contact with sources of water for first 24 hours after molding.
 3. Fabricate and cure test cylinders per ASTM C31, except as follows:
 - a. To verify compressive strength, test cylinders required due to cold weather concreting conditions:
 - 1) Store test specimens on structure as near to point of sampling as possible and protect from elements in same manner as that given to portion of structure as specimen represents.
 - 2) Transport to test laboratory no more than 4 hours before testing. Remove molds from specimens immediately before testing.
 - b. To verify 28-day compressive strength:
 - 1) During first 24 hours after molding, store test specimens under conditions that maintain temperature immediately adjacent to specimens in range of 60 to 80° F. and prevent loss of moisture from specimens.
 - 2) Remove test specimens from molds at end of 20 ± 4 hours and store at 73 ± 3° F., 50 ± 4% relative humidity in laboratory until moment of test.
 4. Compression tests:
 - a. Test 2 cylinders at 3 days.
 - b. Test 2 cylinders at 28 days.
 - c. Hold 2 cylinders in reserve for use as Engineer/Architect directs.
 5. Unless notified by Engineer/Architect, reserve cylinders may be discarded without being tested after 56 days.
- C. Slump Test:
1. Conduct 1 slump test in accordance with ASTM C143 for each 10 yards of concrete placed, or each day's production, whichever is less.
- D. Yield and Proportioning Tests (ASTM C685):
1. When concrete placements involve more than 100 cu yds, accuracy of on-site batching equipment output indicators shall be verified at 50 cu yd intervals.
 2. Accuracy of on-site batching equipment proportioning of concrete mixture shall be verified at 100 cu yd intervals.
- E. Evaluation and Acceptance of Concrete (ACI 301, 1.6.7 and ACI 318, 4.7):
1. Concrete compression tests will be evaluated by Engineer/Architect in accordance with ACI 301, 1.6.7. If number of tests conducted is inadequate for evaluation of concrete or test results for any type of concrete fail to meet

specified strength requirements, core tests may be required as directed by Engineer/Architect.

2. Core tests, when required, per ACI 301, 1.6.7.3.
3. Should tested hardened concrete meet these specifications, Owner will pay for coring and testing of hardened concrete. Should tested hardened concrete not meet these specifications, concrete contractor will pay for coring and testing of hardened concrete and for any corrective action required for unaccepted concrete.

F. Acceptance of Structure (ACI 301,1.7):

1. Acceptance of completed concrete Work will be according to provisions of ACI 301, 1.7.
2. Patched and overlaid areas shall be sounded by Contractor with chain drag after curing for 7 days. Contractor shall repair all hollowness detected by removing and replacing patch or affected area at no extra cost to Owner.
3. If shrinkage cracks appear in overlay when initial 24 hours curing period is completed, overlay shall be considered defective, and it shall be removed and replaced by Contractor at no extra cost.

END OF SECTION 03 37 50

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**MIX DESIGN SUBMITTAL FORM
 LATEX MODIFIED CONCRETE**
 (Submit separate form for each mix design)

I. GENERAL INFORMATION	
Project:	City:
General Contractor:	
Mix Design Identification No.:	
Use (Describe) ⁽¹⁾ :	

⁽¹⁾ Overlay, Floor Patching, Beam Repairs, etc.

II. MIX DESIGN PREPARATION:		
Mix Design Based on (Check one):	Standard Deviation Analysis: or	Trial Mix Test Data:
Design Characteristics:	Density: _____ pcf;	Air: _____ %
	Strength: _____ psi (28 day);	Slump _____ in.

Latex Manufacturer Approval

Name: _____

Title: _____

Date: _____

WALKER ACCEPTANCE STAMP

III. MATERIALS:		
Aggregates: (size; type; source; gradation report; specification)		
Coarse:		
Fine:		
Other Materials:	Type	Product-Manufacturer (Source)
Cement:		
Latex Admixture:		
Other(s):		

IV. <u>MIX PROPORTIONS</u> (per yd³)		
	WEIGHT (lbs.)	ABSOLUTE VOL. (cu. ft.)
Cement:		
Fine Aggregate: ⁽¹⁾		
Coarse Aggregate: ⁽¹⁾		
Latex: ⁽²⁾		
Water: ⁽³⁾		
Other(s):		
TOTALS:		
NOTES: ⁽¹⁾ Based on saturated surface dry weights of aggregates. ⁽²⁾ Include only weight of solids portion of latex admixture. Confirm with manufacturer actual percentages of solids and water in suspension and coordinate with Note 3. ⁽³⁾ Includes ALL WATER , including added water, free water contained on aggregates, and <u>water suspension portion of latex admixture.</u>		

V. RATIOS	
Water ⁽⁴⁾ =	_____ lb.
Cement	_____ lb.
Fine Agg. =	_____ lb.
Total Agg	_____ lb.

VI. SPECIFIC GRAVITIES
Fine Aggregate
Coarse Aggregate

VII. ADMIXTURES		
Air Entraining Agent (A.E.A.):	_____ oz.	per 100# cement
Water Reducer	_____ oz.	per 100# cement
Latex Emulsion	_____ gal	per sack cement
Other(s)		

VIII. <u>STANDARD DEVIATION ANALYSIS:</u>	<u>Yes</u>	<u>N/A</u>
<u>(Complete this section only if mix design was developed using standard deviation analysis of previous project test results. If other method was used, check "N/A".)</u>		
<u>Number of Test Cylinders Evaluated:</u>	<u>Standard Deviation:</u>	
Mix Designs Proportioned to Achieve $f'_{cr} = f'_c + \underline{\hspace{2cm}}$ psi		
<p>NOTE:</p> <p>Mix designs shall be proportioned to achieve f'_{cr} equal to or greater than the larger of $f'_{cr} = f'_c + 1.34s$ [s= calculated standard deviation] or $f'_{cr} = f'_c + 2.33s - 500$ (Refer to ACI 301 for increased deviation factor when less than 30 tests are available.)</p>		

IX. TRIAL MIXTURE TEST DATA:		Yes	N/A
(Complete this section only if mix design is based on data from trial test mixture(s) batched by testing agency or Contractor. If other method was used, check "N/A".)			
<u>Age</u> (days)	<u>Trial Mix #1</u> (comp. str.)	<u>Trial Mix #2</u> (comp. str.)	<u>Trial Mix #3</u> (comp. str.)
<u>7</u>			
<u>7</u>			
<u>28</u>			
<u>28</u>			
28 day average compressive strength: _____ psi			
DESIGN MIX CHARACTERISTICS			
Slump = _____ in.		Air Content = _____ %	
Unit Wet Wt. = _____ pcf		Unit Dry Wt. = _____ pcf	
Mix Design Proportioned to Achieve: f'c + 1200 psi (1200 psi increases to 1400 psi when f'c > 5000 psi)			
ACTUAL MIX CHARACTERISTICS			
Initial Slump = _____ in.		Final Slump _____ in.	
Unit Wet Wt.= _____ pcf.		Unit Dry Wt. = _____ pcf	
Air Content = _____ %			

X. <u>OTHER REQUIRED TESTS</u>
Soluble Chloride Ion Content of mix: _____ % by weight of cement (Water soluble by ASTM 1218 OR AASHTO T260)

XI. <u>Remarks:</u>

Submitted by:

Latex Modified Concrete Supplier
Name:
Address:
Phone Number:
Date:

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

Signature _____

Typed or Printed Name _____

REQUIRED ATTACHMENTS	
	Coarse aggregate grading report
	Fine aggregate grading report
	Concrete compressive strength data used for standard deviation calculations
	Chloride ion data and related calculations
	Admixture compatibility certification letter

INSTRUCTIONS:

1. Fill in all blank spaces. Use -0- (Zero) or N.A. (Not Applicable) where appropriate. See "Design and Control of Concrete Mixtures: 13th Edition by Portland Cement Association, for assistance in completing this form.
2. Provide the necessary documentation to support any laboratory test results or compliance to standard ASTM test methods or specifications referenced in the mix design submittal form.
3. If mix design utilizes multiple aggregate material sources, submit chloride ion content test data of each component from material suppliers. Test data shall be not more than 1 yr old.

Attach letter of certification that all admixtures, including latex admixture, are compatible for this mix design.

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SECTION 03 37 60 – PREPACKAGED REPAIR MORTAR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the provision of all labor, materials, supervision and incidentals necessary to prepare deteriorated or damaged concrete surfaces and install prepackaged concrete repair mortar to formed horizontal, vertical and overhead surfaces to restore original surface condition and integrity.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Submittal Procedures."
 - 2. Division 02 Section "General Concrete Surface Preparation."
 - 3. Division 02 Section "Surface Preparation for Patching and Overlay."
 - 4. Division 03 Section "Cast-In-Place Concrete - Restoration."
 - 5. Division 07 Section "Concrete Joint Sealants."
 - 6. Division 07 Section "Traffic Coatings."

1.3 QUALITY ASSURANCE

- A. Work shall conform to requirements of ACI 301 as applicable except where more stringent requirements are shown on Drawings or specified in this Section.
- B. Testing Agency:
 - 1. Independent testing laboratory employed by Owner and acceptable to Engineer.
 - 2. Accredited by AASHTO under ASTM C1077. Testing laboratory shall submit documented proof of ability to perform required tests.
- C. Sampling and testing of mortar shall be performed by ACI certified Concrete Field Technicians Grade I. Certification shall be no more than three years old.
- D. Testing Agency is responsible for conducting, monitoring and reporting results of all tests required under this Section. Testing Agency has authority to reject mortar not meeting Specifications. Testing Agency does not have the authority to accept mortar that does not meet specifications.
- E. Testing Agency shall submit the following information for Field Testing of Concrete unless modified in writing by Engineer:

1. Project name and location.
2. Contractor's name.
3. Testing Agency's name, address and phone number.
4. Mortar manufacturer.
5. Date of report.
6. Testing Agency technician's name (sampling and testing).
7. Placement location within structure.
8. Weather data:
 - a. Air temperatures.
 - b. Weather.
 - c. Wind speed.
9. Date, time, and place of test.
10. Compressive test data:
 - a. Cube or cylinder number.
 - b. Age of sample when tested.
 - c. Date and time of test.
 - d. Compressive strength.

1.4 REFERENCES

- A. "Standard Specification for Structural Concrete" (ACI 301) by American Concrete Institute, herein referred to as ACI 301, is included in total as specification for this structure except as otherwise specified herein.
- B. Comply with provisions of following codes, specifications and standards except where more stringent requirements are shown on Drawings or specified herein:
 1. "Building Code Requirements for Structural Concrete" (ACI 318), American Concrete Institute, herein referred to as ACI 318.
 2. "Specification for Hot Weather Concreting," ACI 305.1.
 3. "Standard Specification for Cold Weather Concreting," ACI 306.1.
 4. "Standard Specification for Curing Concrete" (ACI 308.1)
- C. Contractor shall have following ACI publications at Project construction site at all times:
 1. "Standard Specifications for Structural Concrete (ACI 301) with Selected ACI and ASTM References," ACI Field Reference Manual, SP15.
 2. "Specification for Hot Weather Concreting," ACI 305.1.
 3. "Standard Specification for Cold Weather Concreting," ACI 306.1.
- D. ASTM International (ASTM):
 1. ASTM C109, "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)."
 2. ASTM C31, "Test Method for Compressive Strength of Cylindrical Concrete Specimens."

3. ASTM C1583, "Standard Test Method for the Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)"

1.5 SUBMITTALS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 MATERIALS

- A. Horizontal Repair and Form and Pour Mortar: Shall be prepackaged cementitious repair mortar capable of horizontal and form and pour partial depth applications, achieving a minimum 3,000 psi compressive strength at 7 days and 5,000 psi compressive strength at 28 days per ASTM C39 as certified by manufacturer with maximum lineal shrinkage of 0.10% at 28 days. Extend per manufacturer's instructions as required for deeper placements.
 1. Acceptable cementitious repair materials for this Work are as follows:
 - a. "MasterEmaco S440," by BASF Corporation.
 - b. "Eucocrete," by Euclid.

- c. "FA-S10 Concrete," by King.
 - d. "Planitop 11," by MAPEI.
 - e. "Sikacrete 211," by Sika.
 - f. Other types may be used only with Engineer's approval in writing prior to bidding.
 2. Acceptable polymer modified materials for this Work are as follows:
 - a. "MasterEmaco T310 CI" by BASF Corporation.
 - b. "Sika Repair 222 with Latex R," "SikaTop 111 Plus", or "Sikacrete 211 SCC+," by Sika
 - c. "Duraltop" by Euclid
 - d. Form-Flo P-38 by Tomes
 - e. Other types may be used only with Engineer/Architect's approval in writing prior to bidding.
- B. Horizontal Repair and Form and Pour Mortar for use with Galvanic Anodes: Shall be prepackaged cementitious repair mortar capable of horizontal and form and pour partial depth applications, achieving a minimum 3,000 psi compressive strength at 7 days and 5,000 psi compressive strength at 28 days per ASTM C39 as certified by manufacturer with maximum linear shrinkage of 0.10% at 28 days.. Manufacturer shall provide written certification of compatibility with galvanic anode corrosion protection system. Extend per manufacturer's instructions as required for deeper placements.
 1. Acceptable materials for this Work are as follows:
 - a. "MasterEmaco S440," by BASF Corporation.
 - b. "EucoRepair CP," by Euclid.
 - c. "FA-S10 Concrete," by King.
 - d. "Sikacrete 211," by Sika.
 - e. "Form Flo P-38," by Tomes.
 - f. Other types may be used only with Engineer's approval in writing prior to bidding.
- C. Rapid Strength Repair Mortar: Shall be prepackaged, cementitious repair mortar. Repair mortar shall be capable of application achieving a minimum 3,500 psi compressive strength at 1 day and 5,000 psi compressive strength at 28 days per ASTM C39 as certified by manufacturer. Extend per manufacturer's instructions as required for deeper placements.
 1. Acceptable materials for this Work are as follows:
 - a. "MasterEmaco T430," by BASF Corporation.
 - b. "Speedcrete 2028," by Euclid.
 - c. "HP-S10 Concrete," by King.
 - d. "Planitop 18 ES" by MAPEI.
 - e. "Sikaquick 1000," by Sika.
 - f. "Aprisa P-80," by Tomes.
 - g. Other types may be used only with Engineer's approval in writing prior to bidding.

D. Trowel Applied Repair Mortar: Shall be prepackaged, cementitious repair mortar capable of vertical/overhead application by trowel achieving a minimum 3,000 psi compressive strength at 7 days and 4,500 psi compressive strength at 28 days per ASTM C 109 as certified by manufacturer.

1. Acceptable materials for this Work are as follows:

- a. "MasterEmaco N425," by BASF Corporation.
- b. "Verticoat Supreme," by Euclid.
- c. "Super-Top," by King.
- d. "Planitop XS," by MAPEI
- e. "Sikaquick VOH," by Sika.
- f. "CT-40 Do All Mortar," by Tomes.
- g. Other types may be used only with Engineer's approval in writing prior to bidding.

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

- a. "MasterEmaco N 400 RS," "MasterEmaco N 400," "MasterEmaco N 426," or "MasterEmaco N 300 CI" by.
- b. "Verticoat," "Speedcrete PM," or "Duraltop Gel" by The Euclid.
- c. "SikaRepair 223 with Latex R", "SikaRepair SHB with Latex R", or "SikaRepair SHA with Latex R," by.
- d. "Super-Top OV" by King
- e. Other types may be used only with Engineer's approval in writing prior to bidding.

E. Horizontal Topping Mortar: Shall be prepackaged cementitious repair mortar capable of horizontal partial depth applications on minimum thickness of 0.5 inches and a maximum thickness of 2 inches, achieving a minimum 3,000 psi compressive strength at 7 days and 5,000 psi compressive strength at 28 days per ASTM C109 as certified by manufacturer. The mortar is not to be extended.

1. Acceptable materials for this Work are as follows:

- a. "MasterEmaco T1061," by BASF.
- b. "Concrete Top Supreme," by Euclid.
- c. "Duro-crete," by King.
- d. "Planitop 15," by MAPEI.
- e. "SikaTop 111 Plus," by Sika.
- f. "CT-40 Do All Mortar," by Tomes.
- g. Other types may be used only with Engineer's approval in writing prior to bidding.

2.3 MATERIAL ACCESSORIES

A. Extended Open Time Epoxy Bonding Agent: Three component, water based, epoxy modified portland cement bonding agent and corrosion inhibitor coating providing the recommended Manufacturer's open time in which to apply repair mortar.

1. Acceptable materials for this Work are:
 - a. "MasterEmaco P124," by BASF.
 - b. "Duralprep A.C.," by Euclid.
 - c. "Planibond 3C," by MAPEI.
 - d. "Armatec 110 EpoCem", by Sika.
 - e. "B-1 Rebar Coating," by Tomes.
- B. Bonding Grout: Bonding grout shall consist of prepackage repair material mixed with sufficient water to form stiff slurry to achieve consistency of "pancake batter."
- C. Clear, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- D. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- E. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Bonding Grout:
 1. Mix bonding grout and scrub into SSD repair substrate with a stiff broom to all areas as indicated on Drawings.
 2. Place repair material prior to initial set of grout. If grout sets prior to placement of repair material, completely remove grout from surface and re-clean prior to proceeding with new grout placement and repair mortar.
- B. Mortar Placement: Mortar materials shall be placed in strict accordance with manufacturer's instructions. Properly proportioned and mixed mortar material shall be placed using tools to consolidate mortar so that no voids exist within new material and continuous contact with base concrete is achieved.
- C. Form and Pour Repair Mortar Placement: Mix and apply in strict accordance with manufacturer's written instructions, to achieve a maximum 9" slump. Consolidate mortar so that no voids exist and continuous contact with base concrete is achieved.
- D. Vertical and Overhead Repairs: Mortar materials shall be placed in strict accordance with manufacturer's instructions. Properly proportioned and mixed mortar material shall be placed using tools to consolidate mortar so that no voids exist within new material and continuous contact with base concrete is achieved. Supplemental wire mesh shall be required for delamination and spall repairs greater than two inches in depth. Fresh bonding grout is required between successive lifts of patching material.
- E. Finishing:

1. Apply a nonslip broom finish to top of floor patches and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Provide a surface finish similar to adjacent surfaces for vertical and overhead partial depth repairs.
3. Finish formed surfaces similar to adjacent surfaces.

3.2 CONCRETE PROTECTION AND CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305R for hot-weather protection during placement. Keep concrete continually moist prior to final curing by evaporation retarder, misting, sprinkling, or using absorptive mat or fabric covering kept continually moist.
- B. Immediate upon conclusion of finishing operation cure concrete in accordance with ACI 308.1 for duration of at least three days by curing methods listed below. Provide additional curing immediately following initial curing and before concrete has dried.
 1. During initial and final curing periods maintain concrete above 50°.
 2. Prevent rapid drying at end of curing period.
- C. Concrete surfaces to receive slab coatings or penetrating sealers shall be cured with moisture curing or moisture-retaining-cover curing.
- D. Curing Methods: Cure formed and non-formed concrete moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 3. Curing compound: Apply curing compound in accordance with manufacturer's instructions.

3.3 FIELD QUALITY CONTROL

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

3.4 EVALUATION AND ACCEPTANCE OF WORK

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

END OF SECTION 03 37 60

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SECTION 03 63 00 - EPOXY INJECTION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the provision of all labor, materials, equipment, supervision and incidentals necessary to prepare cracks in structural concrete members and inject them with a 2-component, moisture-insensitive, 100 percent solids, low-viscosity epoxy resin system.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Submittal Procedures."
 - 2. Division 02 Section "Work Items."
 - 3. Division 02 Section "General Concrete Surface Preparation."
 - 4. Division 02 Section "Surface Preparation for Patching and Overlay."

1.3 QUALITY ASSURANCE

- A. Testing Agency will be independent testing laboratory employed by Owner and approved by Engineer/Architect.
- B. Testing Agency is responsible for conducting, monitoring and reporting to Owner results of all field tests of epoxy injection and installation required under this Section with copy of all reports to Engineer and Contractor.
- C. Submit following information for Field Testing of Epoxy Injection Installation unless modified in writing by Engineer/Architect:
 - 1. Project name and location.
 - 2. Contractor's name.
 - 3. Testing Agency's name, address and phone number.
 - 4. Epoxy material supplier.
 - 5. Date of report.
 - 6. Testing Agency technician's name (sampling and testing).
 - 7. Placement location within structure.
 - 8. Epoxy material data:
 - a. Epoxy type.
 - b. Gel type.

- c. Width of cracks injected (if applicable).
 - d. Crack conditions (dry or wet).
 - e. Injection port spacing.
 - f. Initial and (if different) constant injection pressures.
 - g. Use rate of epoxy.
 - 9. Weather data:
 - a. Air temperatures.
 - b. Weather.
 - c. Wind speed.
 - 10. Field test data:
 - a. Date, time and place of test.
 - b. Thickness of epoxy in crack or void.
- D. Qualifications:
 - 1. Contractor Qualifications: Contractor shall be qualified in the field of concrete repair and protection with a minimum of 5 years experience in application of similar systems and products on projects of similar size and scope.
 - a. Successful completion of a minimum of 3 projects of similar size and complexity to specified Work.
 - b. Contractor shall maintain qualified personnel who have received product training by a manufacturer's representative.
 - c. Install materials in accordance with all safety and weather conditions required by the manufacturer, or as modified by applicable rules and regulations of local, state, and federal authorities having jurisdiction.

Manufacturer Qualifications: The manufacturer of the specified product shall be ISO 9001:2000 Certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis. The manufacturer shall have a minimum 15 years of experience in manufacturing of surface hardener.
- E. Pre-Construction Meetings: Conduct Pre-Construction meeting at Project site to comply with requirements of Division 01 and as specified in this Section.
 - 1. Schedule and convene meeting a minimum of 1 week prior to commencing Work of this Section.
 - 2. Review requirements for application, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details, installation procedures, testing and inspection procedures, protection, and repair.
 - 3. Discuss procedures for protecting adjacent finished Work.

1.4 REFERENCES

- A. "Standard Specifications for Structural Concrete," (ACI 301) by American Concrete Institute, herein referred to as ACI 301, is included in total as specification for this structure except as otherwise specified herein.
- B. Comply with provisions of following codes, specifications and standards except where more stringent requirements are shown on Drawings or specified herein:
 - 1. "Building Code Requirements for Reinforced Concrete," (ACI 318), American Concrete Institute, herein referred to as ACI 318.
 - 2. "Causes, Evaluation, and Repair of Cracks in Concrete Structures" (ACI 224.112), American Concrete Institute.
 - 3. "State-of-the-Art Report on Parking Structures" (ACI 362), American Concrete Institute.
 - 4. "Specification for Crack Repair by Epoxy Injection" (ACI 503.7), American Concrete Institute.
 - 5. "Guide for the Application of Epoxy and Latex Adhesives for Bonding Freshly Mixed and Hardened Concretes", (ACI 503.6), American Concrete Institute.
 - 6. "Standard Specification for Bonding Hardened Concrete, Steel, Wood, Brick, and Other Materials to Hardened Concrete with a Multi-Component Epoxy Adhesive" (ACI 503.1), American Concrete Institute.
 - 7. "Guide for Repair of Concrete Bridge Superstructures" Reported by ACI Committee 546 (ACI 546.1).
- C. Contractor shall have following ACI/ICRI publications at Project construction site at all times:
 - 1. "Specification for Crack Repair by Epoxy Injection" (ACI 503.7), American Concrete Institute." Structural Crack Repair by Epoxy Injection", ACI RAP Bulletin 1, American Concrete Institute.
 - 2. "Standard Specification for Bonding Hardened Concrete, Steel, Wood, Brick, and Other Materials to Hardened Concrete with a Multi-Component Epoxy Adhesive" (ACI 503.1), American Concrete Institute.

1.5 SUBMITTALS

- A. Make submittals in accordance with requirements of Division 01 and as specified in this Section.
- B. Contractor: Submit manufacturer's product data sheets, technical sheets, recommended application procedures and information on epoxy injection equipment.
- C. Testing Agency: Promptly report all test results to Engineer/Architect and Contractor. Include following information:
 - 1. See Article "Quality Assurance," paragraph "Submit following information for Field Testing...."
 - 2. Visual examination of epoxy resin penetration.

- D. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
- E. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

1.6 WARRANTY

- A. System manufacturer and Contractor shall furnish Owner written single source performance guarantee that epoxy resin injection system will be free of defects related to design, workmanship or material deficiency for 3-year period from date of acceptance of Work required under this Section against leakage or bond failure:
 - 1. Any adhesive or cohesive failure.
 - 2. Cracking or other weathering deficiency.
 - 3. Normal abrasion or tear failure.
- B. Any repair under this guarantee shall be done at no cost to Owner. Guarantee shall be provided by Contractor and manufacturer of system.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Injection epoxy shall be one of following:
 - 1. "MasterInject 1380" or "MasterInject 1500" as manufactured by Master Builders Solutions, Shakopee, MN.
 - 2. "Sikadur 35 Hi-Mod LV" or "Sikadur 52" as manufactured by Sika Chemical Corporation, Lyndhurst, NJ.
 - 3. "Epoxy HP-LV" as manufactured by Hunt Process Corp-Southern, Ridgeland, MS.
 - 4. "Pro-Poxy 50 Super LV" as manufactured by Unitex, Kansas City, MO.
 - 5. "Eucopoxy" or "Duralcrete LV" as manufactured by The Euclid Chemical Company, Cleveland OH.
 - 6. "Sure Inject J56 SLV" as manufactured by Dayton Superior Corp., Miamisburg OH.
 - 7. "KonTek 11 LV" as manufactured by Contech Group, Inc. Seattle, WA.
 - 8. "Kemko 038" as manufactured by ChemCo Systems, Inc., Redwood City, CA.
- B. Epoxy gel shall be as specified by the selected injection epoxy manufacturer.
- C. Equipment:
 - 1. Epoxy injection unit shall be portable and equipped with positive displacement-type pumps with interlock to provide positive ration control of epoxy injection resin components. Pumps shall be air or electric powered and shall

- provide in-line mixing and metering system and shall be equipped with drain-back plugs.
2. Equipment used to inject epoxy shall be capable of following:
 - a. Automatic proportioning of materials within mix ratio tolerances set by epoxy resin manufacturer.
 - b. Delivery of components, resin and hardeners, from separate reservoirs to mixing type discharge head.
 - c. Complete and uniform mixing of components at discharge head.
 - d. Injection of resin system at constant pressures not to exceed 150 psi.

PART 3 - EXECUTION

3.1 PREPARATION

A. Crack Identification:

1. All cracks 0.03 in. wide or greater that are designated by Engineer/Architect, and not coincident with principal delamination, shall be injected. Cracks that occur coincident with principal delaminations shall not be injected.
2. Cracks requiring repair shall be located by Contractor at time of construction and marked with chalk.

B. Crack Preparation for Injection:

1. Surface of concrete adjacent to crack must be free of all laitance, efflorescence, dirt or foreign particles.
2. Cracks may be damp or dry as per injection material manufacturer's recommended installation procedures.
3. All cracks shall be properly sealed along their exposed length with an approved epoxy gel.
4. Epoxy injection ports shall be uniformly spaced along crack and shall be installed as recommended by system manufacturer. If concrete member being injected is exposed on both sides, provide injection ports on opposite sides at staggered intervals.
5. Apply epoxy gel around injection port to provide an adequate seal to prevent escape of injection resin from perimeter of port while under pressure.
6. Apply epoxy gel for sealing in manner that will result in minimal defacing or disorganization of concrete substrate.

3.2 INSTALLATION

A. Epoxy Injection:

1. Dispense epoxy injection resin under constant pressure in accordance with manufacturer's recommended procedures or as required to achieve maximum

- filling and penetration of crack without inclusion of air voids in epoxy resin material.
2. Injection shall begin at lowest port and progress incrementally higher.
 3. Appearance of epoxy resin at next higher port shall be considered evidence of successful crack filling.
 4. If penetration of epoxy resin into cracks is not possible, notify Engineer/Architect prior to discontinuing injection procedures. If alternate injection procedures are possible, submit procedure in writing to Engineer/Architect for review.
 5. Contractor shall adhere to all limitations and cautions for epoxy resin injection material as per manufacturer's current printed literature.

B. Cleaning:

1. When cracks are completely filled, allow adhesive to cure for sufficient time to allow the removal of the surface seal without any draining or runback of epoxy material from the cracks.
2. Remove the surface seal material, ports, and injection adhesive runs or spills from concrete surfaces.
3. Finish the face of the crack flush to the adjacent concrete, removing any indentations or protrusions caused by the placement of entry ports.
4. Match work area to adjacent surface including any surface treatments.

3.3 FIELD QUALITY CONTROL BY TESTING AGENCY

A. Core Testing:

1. Testing Agency shall obtain 3- 2 in. minimum diameter core samples in first 100 ft of repaired cracks and 1 core for each 100 ft thereafter. Cores shall be taken after injection resin has cured for period of 7 days. Core sample shall be for full crack depth. Core locations and sizes shall be submitted to Engineer/Architect for review prior to taking core samples. Care should be taken not to damage or cut existing reinforcement (ESPECIALLY POST-TENSIONING TENDONS).
2. Core samples shall be visually examined to determine degree of epoxy penetration. Minimum of 90% of crack shall be full of epoxy adhesive.

B. Evaluation and Acceptance of Epoxy Injection:

1. Results of visual examination will be reviewed by Engineer/Architect for compliance with Article "Field Quality Control by Testing Agency," paragraph "Core Testing."
2. If results of initial cores fail by lack of penetration, work shall not proceed further until area represented by cores has been re-injected and re-tested for acceptance.
3. After cracks have been re-injected, additional cores shall be taken as directed by Engineer/Architect. Cores shall be tested for compliance with Article "Field Quality Control by Testing Agency," paragraph "Core Testing" by Owner's Testing Agency at Contractor's expense.
4. Core holes shall be filled with non-shrink grout material. Grout shall be applied with hard trowel, and be thoroughly rodded and tamped in place. Finish, texture

and color to match existing surface. Materials and procedures for filling testing core holes shall be submitted to Engineer/Architect for review prior to starting work.

C. Acceptance of Structure:

1. Acceptance of completed concrete injection work will be according to requirements of Article "Field Quality Control by Testing Agency," paragraph "Core Testing."
2. Grouted core holes shall be sounded by Engineer/Architect and Contractor with hammer or rod after curing for 48 hours.

END OF SECTION 03 63 00

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SECTION 07 81 00 - APPLIED FIRE PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Sprayed fire-resistive materials.

1.2 DEFINITIONS

- A. SFRM: Sprayed fire-resistive materials.

1.3 ACTION SUBMITTALS

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

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by applied fire protection material manufacturer as experienced and with sufficient trained staff to install manufacturer's products in accordance with specified requirements.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply applied fire protection when ambient or substrate temperature is 44 deg F (7 deg C) or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of fire protection, providing complete air exchanges in accordance with manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fire protection dries thoroughly.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain applied fire protection from single source.

2.2 PERFORMANCE REQUIREMENTS

- A. Assemblies: Provide applied fire protection, including auxiliary materials, in accordance with requirements of each fire-resistance design and manufacturer's written instructions.
- B. Fire-Resistance Design: Provide 3-hour fire rating. Consult with manufacturer for products.
- C. Asbestos: Provide products containing no detectable asbestos.

2.3 SPRAYED FIRE-RESISTIVE MATERIALS

- A. Sprayed Fire-Resistive Material:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Carboline Company; a subsidiary of RPM International.
 - b. GCP Applied Technologies Inc.
 - c. Isolatek International.
 - d. Southwest Fireproofing Products Co.
 - 2. Application: Designated for exterior use by a qualified testing agency acceptable to authorities having jurisdiction.
 - 3. Bond Strength: Minimum 150-lbf/sq. ft. cohesive and adhesive strength based on field testing in accordance with ASTM E736/E736M.
 - 4. Density: Not less than density specified in the approved fire-resistance design, in accordance with ASTM E605/E605M.
 - 5. Thickness: As required for fire-resistance design indicated, measured in accordance with requirements of fire-resistance design or ASTM E605/E605M, whichever is thicker, but not less than 0.375 inch (9 mm).
 - 6. Combustion Characteristics: ASTM E136.
 - 7. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 10 or less.
 - 8. Corrosion Resistance: No evidence of corrosion in accordance with ASTM E937/E937M.
 - 9. Deflection: No cracking, spalling, or delamination in accordance with ASTM E759/E759.
 - a. Color: Match Adjacent or as approved by Owner.

2.4 AUXILIARY MATERIALS

- A. Provide auxiliary materials that are compatible with sprayed fire-resistive material and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved in writing by sprayed fire-resistive material manufacturer and complying with one or both of the following requirements:
 - 1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 2. Primer's bond strength in required fire-resistance design complies with specified bond strength for sprayed fire-resistive material and with requirements in UL's "Product iQ" online directory or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests in accordance with ASTM E736/E736M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and in accordance with each fire-resistance design.
 - 1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of applied fire protection with substrates under conditions of normal use or fire exposure.
 - 2. Verify that objects penetrating applied fire protection, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 - 3. Verify that substrates receiving applied fire protection are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fire protection application.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Cover other work subject to damage from fallout or overspray of applied fire protection materials during application.
- B. Clean substrates of substances that could impair bond of applied fire protection.

- C. Prime substrates where included in fire-resistance design and where recommended in writing by sprayed fire-resistive material manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive applied fire protection.

3.3 APPLICATION

- A. Construct applied fire protection assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting applied fire protection Work.
- B. Comply with sprayed fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fire protection; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- C. Install auxiliary materials as required, as detailed, and in accordance with fire-resistance design and sprayed fire-resistive material manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by sprayed fire-resistive material manufacturer.
- D. Spray apply fire protection to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by sprayed fire-resistive material manufacturer.
- E. Extend applied fire protection in full thickness over entire area of each substrate to be protected.
- F. Install body of applied fire protection in a single course unless otherwise recommended in writing by sprayed fire-resistive material manufacturer.
- G. For applications over encapsulant materials, including lockdown (post-removal) encapsulants, apply fire protection that differs in color from that of encapsulant over which it is applied.
- H. Where sealers are used, apply products that are tinted to differentiate them from applied fire protection over which they are applied.
- I. Provide a uniform finish complying with description indicated for each type of applied fire protection material.
- J. Cure applied fire protection in accordance with sprayed fire-resistive material manufacturer's written instructions.
- K. Do not install enclosing or concealing construction until after applied fire protection has been inspected, tested, and corrections have been made to deficient applications.

- L. Finishes: Where indicated, apply fire protection to produce the following finishes:
 - 1. Manufacturer's Standard Finishes: Finish in accordance with manufacturer's written instructions for each finish selected.
 - 2. Spray-Textured Finish: Finish left as spray applied with no further treatment.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: **Owner will engage** a qualified special inspector to perform the following special inspections:
- B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fire protection for the next area until test results for previously completed applications of fire protection show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.
- C. Applied fire protection will be considered defective if it does not pass tests and inspections.
 - 1. Remove and replace applied fire protection that does not pass tests and inspections, and retest.
 - 2. Apply additional applied fire protection, in accordance with manufacturer's written instructions, where test results indicate insufficient thickness, and retest.
- D. Prepare test and inspection reports.

3.5 CLEANING

- A. Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

3.6 PROTECTION

- A. Protect applied fire protection from damage resulting from construction operations or other causes in accordance with manufacturer's and Installer's written instructions, so applied fire protection is without damage or deterioration at time of Substantial Completion.

3.7 REPAIRS

- A. As installation of other adjacent construction proceeds, inspect applied fire protection and repair damaged areas due to work of other trades before concealing it with other construction.

- B. Repair applied fire protection using same method and materials as original installation or using manufacturer's recommended trowel-applied repair product.

END OF SECTION 07 81 00

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SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.

1.3 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Reference Division 01 Specification Sections that apply to the preinstallation meeting requirements.
 - 1. Review waterproofing requirements including, but not limited to, the following:
 - a. Surface preparation specified in other Sections.
 - b. Minimum curing period.
 - c. Forecasted weather conditions.
 - d. Special details and sheet flashings.
 - e. Repairs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch wide joints formed between two 6-inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.
- C. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:
 - 1. Joint-sealant location and designation.
 - 2. Manufacturer and product name.
 - 3. Type of substrate material.
 - 4. Intended test.
 - 5. Number of samples required.
- D. Preconstruction Laboratory Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.
- E. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates.
- H. Field-Adhesion-Test Reports: For each sealant application tested.
- I. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this section.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.
 3. Submit manufacturer's recommended number of pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials.
 4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 5. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.
 6. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 2. Conduct field tests for each kind of sealant and joint substrate.
 3. Notify Architect/Engineer seven days in advance of dates and times when test joints will be erected.
 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.8 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.9 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Ten years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content: Sealants and sealant primers shall comply with the following:
 1. Architectural sealants shall have a VOC content of 250 g/L or less.
 2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.

3. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Colors of Exposed Joint Sealants: As indicated by manufacturer's designations and selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, NT: Single-component, non-sag, plus 100 percent and minus 50 percent movement capability, non-traffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50/50, Use T and NT.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Dow Corning Corporation – Dow Corning Brand Parking Structure Sealants.
- B. Silicone, S, NS, 50, NT: Single-component, non-sag, plus 50 percent and minus 50 percent movement capability, non-traffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Dow Corning Corporation – Dow Corning 795.

2.3 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Non-staining; cylindrical Sealant Backings, ASTM C 1330, Type C, compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Nomaco – SOFROD.
 - b. BASF Corporation-Construction Systems.
- B. 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. Provide self-adhesive tape where applicable.

2.4 SELF-ADHERING MEMBRANE FLASHING AND SEALANT

- A. High-Temperature resistive self-adhering underlayment withstand temperatures up to 250 degree Fahrenheit (121 degree Celsius) under existing storefront sill metal flashing and strip-over roof termination counter-flashing.
 - 1. WIP 300HT; Carlisle. Or approved equivalent.
- B. Multi-component, chemical curing, low modulus, non-sag, polyurethane sealant.
 - 1. CCW-201; Carlisle. Or approved equivalent compatible with the self-adhering membrane flashing from the same manufacturer.

2.5 MISCELLANEOUS MATERIALS

- A. 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.
- B. 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.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant

- manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Brick masonry.
 3. Remove laitance and form-release agents from concrete.
 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

- F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 2. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. 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 kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
 - 3. 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 material, sealant configuration, and sealant dimensions.
 - 4. 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.

- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 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.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

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SECTION 07 92 33 –CONCRETE JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Materials shall be compatible with materials or related Work with which they come into contact, and with materials covered by this Section.
 - 2. Distribute reviewed submittals to all others whose Work is related.

3. Coordinate layout of joint system and approve methods for providing joints with precast concrete and concrete contractors.
 4. Inspect site and precast plant before precast production to insure proper joint configuration.
- B. Make submittals in accordance with requirements of Division 01 Section, "Submittal Procedures:"
1. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
 2. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.
- C. Submittals and Resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal data the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including the cost of Engineer's services made necessary to review such additional resubmittals. Owner shall in turn reimburse Engineer.
- D. Requests For Information
1. Engineer reserves the right to reject, unprocessed, any Request for Information (RFI) that the Engineer, at its sole discretion, deems frivolous.
 2. Engineer reserves the right to reject, unprocessed, any RFI that the Engineer, at its sole discretion, deems already answered in the Contract Documents.
 3. RFI process shall not be used for requesting substitutions. Procedures for substitutions are clearly specified elsewhere in the contract documents.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATION SUBMITTALS

- A. Certificates:

1. Evidence of installer's being certified by manufacturer. Evidence shall include complete copy of manufacturer's licensing/certification document, spelling out repair responsibility for warranty claims.
 2. Certification from the Manufacturer that joint details as specified are acceptable for system to be installed at least 1 month before placement of any concrete which will receive joint sealant.
- B. Field Quality Control:
1. Two copies each of manufacturer's technical representative's log for each visit.
 2. Testing agency field and test reports.
- C. Qualification Statements:
1. Manufacturer's qualifications as defined in the "Quality Assurance" article.
 2. Installer's qualifications as defined in the "Quality Assurance" article.
 3. Signed statement from this Section applicator certifying that applicator has read, understood, and shall comply with all requirements of this Section.

1.6 CLOSEOUT SUBMITTALS

- A. Final executed Warranty.

1.7 QUALITY ASSURANCE

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

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

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all materials to site in original, unopened containers, bearing following information:
 - 1. Name of product.
 - 2. Name of manufacturer.
 - 3. Date of preparation.
 - 4. Lot or batch number.
- B. Store materials under cover and protect from weather. Replace packages or materials showing any signs of damage with new material at no additional cost to Owner.

1.9 FIELD CONDITIONS

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

1.10 WARRANTY

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

2. Weathering.
 3. Abrasion or tear failure resulting from normal traffic use.
- B. If material surface shows any of defects listed above, supply labor and material to repair all defective areas and to repaint all damaged line stripes.
- C. Warranty period shall be a 5 year Joint and Several Warranty commencing with date of acceptance of work.
- D. Perform any repair under this warranty at no cost to Owner.
- E. Address the following in the terms of the Warranty: length of warranty, change in value of warranty – if any- based on length of remaining warranty period, transferability of warranty, responsibilities of each party, notification procedures, dispute resolution procedures, and limitations of liability for direct and consequential damages.
- F. Snowplows, vandalism, and abnormally abrasive maintenance equipment are not normal traffic use and are exempted from warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 MATERIALS, JOINT SEALANT SYSTEM

- A. Provide complete system of compatible materials designed by manufacturer to produce waterproof, traffic-bearing control joints as detailed on Drawings.
- B. Compounds used for sealants shall not stain masonry or concrete. Aluminum pigmented compounds not acceptable.
- C. Color of sealants shall match adjacent surfaces.
- D. Closed cell or reticulated backer rods: Acceptable products:
1. "Sof Rod," Nomaco Inc., 501 NMC Drive, Zebulon, NC 27597. (800) 345-7279 ext. 341.

2. "ITP Soft Type Backer Rod," Industrial Thermo Polymers Limited, 2316 Delaware Ave., Suite 216, Buffalo, NY 14216. (800) 387-3847.
 3. "MasterSeal 921 Backer Rod," BASF.
- E. Bond breakers and fillers: as recommended by system manufacturer.
- F. Primers: as recommended by sealant manufacturer.
- G. Acceptable sealants are listed below. Sealants shall be compatible with all other materials in this Section and related work.
- H. Acceptable polyurethane control joint sealants (traffic bearing):
1. MasterSeal SL-2 or MasterSeal SL-2 SG, BASF.
 2. Iso-flex 880 GB or Iso-flex 881, Lymtal.
 3. Dynatrol II-SG or Urexpan NR 200, Pecora.
 4. Sikaflex-2c SL or Sikaflex-2c NS TG, Sika.
 5. THC-901, Vulkem 45SSL, Dymeric 240 FC or Dymonic 100, Tremco.
- I. Acceptable polyurethane vertical and cove joints sealants (non-traffic bearing):
1. Sikaflex-2c NS EZ, Sika.
 2. MasterSeal NP-2, BASF.
 3. Dymeric 240FC, Dymonic 100 or THC 901 (cove only), Tremco.
 4. Dynatred, Pecora.
 5. Iso-flex 881, Lymtal.
- J. Acceptable silicone vertical and cove joint sealants (non-traffic bearing):
1. Spectrem 1 or Spectrem 4-TS, Tremco.
 2. 311-NS, Pecora.
 3. Dow Corning NS Parking Structure Sealant, Dow Corning.
- K. Substitutions: None for this project.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive Work and report immediately in writing to Engineer/Architect any deficiencies in surface which render it unsuitable for proper execution of Work.
- B. Coordinate and verify that related Work meets following requirements before beginning installation
1. Concrete surfaces are finished as acceptable for system to be installed.

2. Curing compounds used on concrete surfaces are compatible with system to be installed.
3. Concrete surfaces have completed proper curing period for system selected.

3.2 PREPARATION

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

3.3 INSTALLATION/APPLICATION

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

3.4 FIELD QUALITY CONTROL

- A. Contractor and Engineer/Architect will jointly determine which one of following 2 methods of sealant testing to verify sealant profile:
 - 1. Contractor, at Engineer/Architect's direction, shall cut out lesser of 1% of total lineal footage placed or total of 100 lineal ft of joint sealant at isolated/random locations (varying from in. to ft of material) for Engineer/Architect and Manufacturer's Representative inspection of sealant profile.
 - 2. Contractor, at Engineer/Architect's direction, shall install 3 trial joint sections of 20 ft each. Contractor shall cut out joint sections, as selected by Engineer/Architect, for Engineer/Architect and Manufacturer's Representative inspection. Additional isolated/random removals may be required where sealant appears deficient. Total cut out sealant shall not exceed lesser of 1% of total lineal footage placed or total of 100 lineal ft of joint sealant at isolated/random locations (varying from in. to ft of material) for Engineer/Architect and Manufacturer's Representative inspection of sealant profile.
- B. Repair all random joint sealant "cut out" sections at no cost to Owner.
- C. Testing Agency:
 - 1. Check shore hardness per ASTM standard specified in sealant manufacturer's printed data.
 - 2. If flood test of joints required by this Section, report results to Engineer/Architect.

END OF SECTION 07 92 33

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SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on **interior substrates**.
 - 1. Concrete.
 - 2. Concrete masonry units (CMUs).
 - 3. Steel and iron.
 - 4. Galvanized metal.
 - 5. Gypsum board.
- B. Related Requirements:
 - 1. **Division 05, Section "Structural Steel Framing"** for shop priming structural steel.
 - 2. Division 05, Section "Metal Fabrications" for shop priming metal fabrications.
 - 3. Division 05, Section "Metal Pan Stairs" for shop priming metal pan stairs.
 - 4. Division 05, Section "Pipe and Tube Railings" for shop **priming** pipe and tube railings.
 - 5. Division 09, Section "High-Performance Coatings" for tile-like coatings.

1.3 DEFINITIONS

- A. MPI Gloss Level 1 (Matte Finish): Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 3 ('Egg-shell-Like' Finish): 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 4 ('Satin-Like' Finish): 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 5 (Semi-Gloss Finish): 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. MPI Gloss Level 6 (Gloss): 70 to 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include Printout of current "MPI Approved Products List" for each product category specified, with the specified product highlighted.
 - 2. Indicate VOC content.
- B. Sustainable Design Submittals:
 - 1. Product Data: For paints and coatings, indicating VOC content.
 - 2. Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for low-emitting materials.
- C. Samples for Initial Selection: For each type of topcoat product.
- D. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- E. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: **5 percent**, but not less than **1 gal. (3.8 L)** of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 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. Behr Process Corporation.
 2. Benjamin Moore & Co.
 3. California Paints.
 4. Conco Paints.
 5. Coronado Paint; Benjamin Moore Company.
 6. Diamond Vogel Paints.
 7. Dulux (formerly ICI Paints); a brand of AkzoNobel.
 8. Dunn-Edwards Corporation.
 9. Duron, Inc.
 10. Frazee Paint; Comex Group.
 11. Glidden Professional.

12. Kelly-Moore Paint Company Inc.
13. Kwal Paint; Comex Group.
14. M.A.B. Paints.
15. Parker Paint; Comex Group.
16. PPG Architectural Finishes, Inc.
17. Pratt & Lambert.
18. Rodda Paint Co.
19. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
20. Sherwin-Williams Company (The).
21. Zinsser; Rust-Oleum Corporation.

- B. Products: Subject to compliance with requirements, **provide product** listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
1. Flat Paints and Coatings: 50 g/L.
 2. Nonflat Paints and Coatings: 50 g/L.
 3. Dry-Fog Coatings: 150 g/L.
 4. Primers, Sealers, and Undercoaters: 100 g/L.
 5. Rust-Preventive Coatings: 100 g/L.
 6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
 7. Pretreatment Wash Primers: 420 g/L.
- D. Low-Emitting Materials: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- E. Colors: **As indicated in a color schedule**

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (CMUs): 12 percent.
 - 3. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer
 - 1. SSPC-SP 2.
 - 2. SSPC-SP 3.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- D. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards
 - b. Uninsulated metal piping.
 - c. Pipe hangers and supports.
 - d. Metal conduit.
 - e. Tanks that do not have factory-applied final finishes.
 - 2. Paint the following work where exposed in occupied spaces:

- a. Equipment, including panelboards.
- b. Uninsulated metal piping.
- c. Pipe hangers and supports.
- d. Metal conduit.
- e. Other items as directed by Architect.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Non-traffic Surfaces:
 1. Latex System **MPI INT 3.1A**
 - a. Prime Coat: Primer, alkali resistant, water based
 - b. Prime Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, flat (MPI Gloss Level 1)
 2. Concrete Stain System **MPI INT 3.1K**:
 - a. First Coat: Stain, interior, matching topcoat.

- b. Topcoat: Stain, interior, **MPI #58.**
- B. CMU Substrates:
 - 1. Institutional Low-Odor/VOC Latex System **MPI INT 4.2E:**
 - a. Block Filler: Block filler, latex, interior/exterior, **MPI #4.**
 - b. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 2).
- C. Steel Substrates:
 - 1. Alkyd over Shop-Applied Quick-Drying Shop Primer System **MPI INT 5.1W:**
 - a. Prime Coat: Primer, quick dry, for shop application, **MPI #275.**
 - b. Topcoat: Alkyd, interior, gloss (MPI Gloss Level 6), **MPI #48.**
- D. Galvanized-Metal Substrates:
 - 1. Alkyd over Cementitious Primer System **MPI INT 5.3C:**
 - a. Prime Coat: Primer, galvanized, cementitious, **MPI #26.**
 - b. Topcoat: Alkyd, interior, gloss (MPI Gloss Level 6), **MPI #48.**
- E. Gypsum Board Substrates:
 - 1. Latex over Latex Sealer System **MPI INT 9.2A:**
 - a. Prime Coat: Primer sealer, latex, interior, **MPI #50.**
 - b. Prime Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior (MPI Gloss Level 3), **MPI #52.**

END OF SECTION 09 91 23

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SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of high-performance coating systems, on the following substrates:
 - 1. Interior Substrates:
 - a. Steel.
- B. Related Requirements:
 - 1. Division 05, Section "Structural Steel Framing" for shop priming of structural steel with primers specified in this Section.

1.3 DEFINITIONS

- A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the specified product highlighted.
 - 2. Indicate VOC content.
- B. Sustainable Design Submittals:
 - 1. Product Data: For paints and coatings, indicating VOC content.
 - 2. Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for low-emitting materials.

- C. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each coating system.
 - a. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Behr Process Corporation.
 - 2. Benjamin Moore & Co.
 - 3. Comex Industrial Coatings; Comex Group.
 - 4. Corotech Coatings; Benjamin Moore & Co.
 - 5. Devoe Paint Company; Akzo Nobel.
 - 6. Diamond Vogel Paints.
 - 7. Dulux (formerly ICI Paints); a brand of AkzoNobel.
 - 8. PPG Architectural Finishes, Inc.
 - 9. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
 - 10. Sherwin-Williams Company (The).
 - 11. Tnemec Inc.
- B. Products: Subject to compliance with requirements, provide one of the products listed in the Exterior High-Performance Coating Schedule or Interior High-Performance Coating Schedule for the coating category indicated.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

3. Products shall be of same manufacturer for each coat in a coating system.
- C. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
1. Flat Paints and Coatings: 50 g/L.
 2. Nonflat Paints and Coatings: 50 g/L.
 3. Primers, Sealers, and Undercoaters: 100 g/L.
 4. Rust-Preventive Coatings: 100 g/L.
 5. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
- D. Low-Emitting Materials: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.3 SOURCE QUALITY CONTROL

- A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Concrete: 12 percent.
 2. Masonry (Clay and CMUs): 12 percent.

3. Gypsum Board: 12 percent.
 4. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:
1. SSPC-SP 7/NACE No. 4.
 2. SSPC-SP 11.
 3. SSPC-SP 6/NACE No. 3.
 4. SSPC-SP 10/NACE No. 2.
 5. SSPC-SP 5/NACE No. 1.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for coating and substrate indicated.
 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
1. Contractor shall touch up and restore coated surfaces damaged by testing.
 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates:

1. Epoxy System:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss.
2. High-Build Epoxy over Epoxy Zinc-Rich Primer System:
 - a. Prime Coat: Primer, zinc-rich, epoxy.
 - b. Intermediate Coat: Epoxy, high build, low gloss.
 - c. Topcoat: Epoxy, gloss.
 - d. Topcoat: Epoxy, high-build, low gloss.
3. Epoxy over Self-Priming Epoxy System:
 - a. Prime Coat: Epoxy, high build, self-priming.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss.
4. Epoxy, High-Build System:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal.
 - b. Intermediate Coat: High-build epoxy, matching topcoat.
 - c. Topcoat: High-build epoxy, low gloss.
 - d. Topcoat: High-build epoxy, gloss.
5. Epoxy Deck Coating System:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal.
 - b. Intermediate Coat: Epoxy, gloss.
 - c. Topcoat: Epoxy deck coating (slip resistant).
6. Epoxy-Modified Latex System:
 - a. Prime Coat: Primer, rust inhibitive, water based.
 - b. Intermediate Coat: Epoxy-modified latex, interior, matching topcoat.
 - c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5).

- d. Topcoat: Epoxy-modified latex, gloss (MPI Gloss Level 6).
- 7. Pigmented Polyurethane over Epoxy Primer System:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal.
 - b. Intermediate Coat: Polyurethane, two components, pigmented, matching topcoat.
 - c. Topcoat: Polyurethane, two components, pigmented, gloss (MPI Gloss Level 6).
- 8. Pigmented Polyurethane over High-Build Epoxy System:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal.
 - b. Intermediate Coat: Epoxy, high build.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6).
- 9. Pigmented Polyurethane over Self-Priming Epoxy System:
 - a. Prime Coat: Epoxy, high build, self-priming.
 - b. Intermediate Coat: Polyurethane, two component, pigmented, matching topcoat.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6).
- 10. Pigmented Polyurethane over Inorganic Zinc and Epoxy System:
 - a. Prime Coat: Primer, zinc rich, inorganic.
 - b. Intermediate Coat: Epoxy, gloss.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6).
- 11. Pigmented Polyurethane over Epoxy Zinc-Rich and Epoxy System:
 - a. Prime Coat: Primer, zinc rich, epoxy.
 - b. Intermediate Coat: Epoxy, gloss.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6).

B. Galvanized-Metal Substrates:

- 1. Epoxy over Epoxy Primer System:

- a. Prime Coat: Primer, epoxy, anti-corrosive, for metal.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss.
2. Epoxy over Vinyl Wash Primer and Epoxy Primer System:
- a. Prime Coat: Primer, vinyl wash.
 - b. Intermediate Coat: Primer, epoxy, anti-corrosive, for metal.
 - c. Topcoat: Epoxy, gloss.

END OF SECTION 09 96 00

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SECTION 31 45 01 – INJECTION GROUTING WITH HIGH DENSITY POLYURETHANE FOAM (HDPF)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes soil densification to strengthen base and sub-base soils under concrete pavement.
- B. Extent of Work is as shown in Drawings and shall include but not be limited to following:
 - 1. Subsurface work.
 - 2. Disposal of excess materials.
- C. Work includes furnishing and injecting a two-part 1:1 by volume, water-resistant High-Density Polyurethane Foam (HDPF) into the foundation soils beneath the pavement through holes or injection tubes at locations shown on the plans or as directed, while monitoring for movement at the surface.
- D. Soil densification by injecting HDPF will be limited to foundation areas as specified on Drawings.
- E. Related Sections:
 - 1. Division 01 Section "Submittal Procedures."
 - 2. Division 31 Section "Site Clearing."
- F. Protection of Adjacent Property: Contractor shall develop written protection and monitoring programs. These programs shall be reviewed and approved by Owner's Geotechnical Consultant prior to proceeding with Work.

1.3 SUBMITTALS

- A. Submit shop drawings indicating locations of holes for injection of HDPF. Submit specifications of equipment which will be used to perform compaction.
- B. Submit compressive strength test results of intended HDPF materials. Documentation shall specify source of intended materials.

- C. Before construction begins, submit HDPF injection experience documentation of subcontractor who is to perform Work.
- D. Copies of daily log shall be submitted to Owner and Engineer/Architect weekly.
- E. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
- F. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

1.4 QUALITY ASSURANCE

- A. Testing Agency will be independent testing laboratory employed by Owner and accepted by Engineer/Architect.
- B. Testing Agency shall make such tests as are deemed necessary to insure that specified minimum relative densities and bearing capacities have been achieved. Testing Agency shall be responsible for inspections, testing, and interpretation of test results. Testing shall, as minimum, be in accordance with paragraph "Field Quality Control by Testing Agency."
- C. Testing Agency shall verify and record:
 - 1. Time and amperage required for each injection.
 - 2. Amounts of HDPF required per injection hole to be used as an indication of the average material used for the Work. This Item will be measured by the pound of HDPF injected and accepted, as defined under section on 'Unit Prices' (Section 1.6). Measure the two chemical components and total to calculate the total weight of the material.
- D. Testing Agency shall conduct preconstruction survey of adjacent structures per paragraph "Inspection."
- E. Contractor shall have been in specialty foundation field for at least 5 yrs, and shall provide documentation of completed projects similar to this project within past 5 yrs.
- F. Contractor shall employ sufficient measures to prevent damage to adjacent structures.

1.5 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - ASTM D-1622 Standard Test Method for Apparent Density of Rigid Cellular Plastics
 - ASTM D-1621 Standard Test Method for Compressive Properties of Rigid Cellular Plastics

- ASTM D-1623 Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
- ASTM C-273 Standard Test Method for Shear Properties of Sandwich Core Materials
- ASTM D-790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- ASTM D-1940 Tentative Method of Test for Porosity of Rigid Cellular Plastics
- TxDOT SS-3086 Soil Densification and Raising Concrete Slabs with High Density Polyurethane Foam (HDPF)

B. *Report of Geotechnical Field and Laboratory Data Collection, February 7, 2022, TWE Project No. 22.14.011, by Tolunay-Wong Engineers, Inc.* Records of subsurface investigation are made available for information only and do not guarantee that all conditions that may be encountered have been identified.

1.6 UNIT PRICES

- A. State in Bid Form total weight of HDPF materials as basis for base bids. This Item will be measured by the pound of HDPF injected and accepted. Measure the two chemical components and total to calculate the total weight of the material.
- B. List equipment available for this project to complete Work. Include fair value of equipment as well as rental rate per hour for equipment operated and maintained. This information will be used as basis for paying for any specified extra injection work which may be requested for any of these pieces of equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Furnish a two-part 1:1 by volume High Density Polyurethane Foam (HDPF). The material must reach 90% compressive strength within 30 min of injection and have a water insoluble diluent, which permits the formation of polyurethanes in excess water.
- B. Furnish materials in accordance with the following:

ASTM D-1622	Density	3.8 to 4.2 pounds / cubic foot
ASTM D-1621	Compressive Strength	60 psi (minimum)
ASTM D-1623	Tensile Strength	90 psi (minimum)
ASTM C-273	Shear Strength	45 psi (minimum)
ASTM D-790	Flexural Strength	90 psi (minimum)
ASTM D-1940	Closed Cell Content	+85%

- C. Furnish non-shrink grout to patch drill holes. The grout must meet the requirements of DMS 4675 and used within the shelf life and temperature limitations set by the manufacturer.

PART 3 - EXECUTION

3.1 EQUIPMENT

- A. Provide machinery, tools, and equipment necessary for proper execution of the work. At a minimum, provide the following:
 - 1. *Dynamic Cone Penetrometer (DCP)*. Provide a portable DCP for on-site soils investigation to assist in location and depth of weak foundation soils and determination of correct injection pattern and injection elevations through tubes to densify weak soils. Extension rods are required to perform this investigation.
 - 2. *Drill*. Use a pneumatic or electric drill capable of efficiently drilling 5/8 in. to 2-in. diameter (if needed for multiple injection tubes) injection holes through the pavement without damaging the structural integrity of the existing pavement. Drill host holes for the placement of injection tubing cut to proper length(s).
 - 3. *Pumps*. Furnish as a minimum 2 trucks each with 2 mounted pumping units capable of injecting the polyurethane material at a controlled rate into the foundation soils to the require depths. Ensure:
 - a. the pumping units are equipped with certified flow meters to precisely measure the amount of each component injected, so that the 1:1 ratio by volume is maintained for quality control and a certified volume of injected polymer material is obtained;
 - b. the pumping units are equipped with pressure and temperature control devices capable of maintaining proper temperature.
 - 4. *Level*. Provide satisfactory equipment such as rotating laser levels and receivers to monitor movement of the pavement to within a tenth-of-an-inch, to verify that the injected foundation soils have been properly densified and to ensure the proper lift of pavement to grade is achieved.

3.2 INSPECTION

- A. Examine areas and conditions under which Work is to occur. Contractor shall notify Engineer/Architect immediately in writing of all conditions detrimental to proper and timely completion of Work or any conditions in Work which, in Contractor's opinion, would prevent satisfactory completion of Work. Contractor's commencement of Work and failure to make such reports will be regarded as acceptance of conditions.
- B. Proceed with Work only after unsatisfactory conditions have been acceptably remedied.
- C. Testing Agency shall conduct visual survey of adjacent structures to establish record of structures' conditions prior to commencement of Work. Within two weeks of completion of Work, Testing Agency shall resurvey adjacent structures. Surveys shall include visual observations, crack monitoring, detailed notes, photographs, and video

recordings of structures' conditions. Surveys shall be used to monitor effect of Work on adjacent structures including, but not limited to, foundations, exterior and interior walls, chimneys, piping connections, and floor elevations. Testing Agency shall make reasonable effort to notify, cooperate with, and otherwise inform owners of adjacent structures of survey and its purpose.

3.3 PREPARATION

- A. Locate utilities, buildings, and other structures into which injected material may intrude.
- B. Coordinate Work with all utility companies.
- C. Prepare a profile of each area to determine the extent of the concrete slab that requires adjustment and/or raising.
- D. Ensure that the finished concrete slabs will conform to the grades and cross-section of the slabs as shown in the plans or as directed under injection and patching requirements (Section 3.6).
- E. Determine the exact locations of the injection holes for each treated area. Obtain approval for the injection hole locations.

3.4 DRILLING

- A. Use drilling operations that do not damage the surrounding concrete.
- B. Drill injection holes through the concrete, with diameters from 5/8 in. to 2-in. diameter holes, vertical and round, and to a depth indicated on the approved field QC plan.
- C. Install injection tubes to the prescribed injection depth or depths.

3.5 MIXING

- A. Use the flow meters, to perform a quality check on the ratio of the two-part chemical system. The part A (Resin) to the part B (ISO) ratio by volume should be 1:1.
- B. Each day, reset the flow meters on the pumping units to zero. Perform a test shot of material from 1 injection gun at a time with a minimum of 0.5 gal. of each material, comparing the digital output in gallons of resin to the gallons of ISO to determine the injected ratio.
- C. The ratio range must be between 0.95 to 1.05 for all the injection guns to be used on the project. Furnish the most recent calibration documents for the flow meters prior to using on the project.

3.6 INJECTION AND PATCHING

- A. Inject high-density polyurethane formulation through holes, via injection tubes into the foundation soils beneath the pavement to the assessed depth or depths.
- B. Control the stabilization of the foundation soils by regulating the rate of injection of the material.
- C. Continuously monitor for movement of the pavement. Foundation soils are sufficiently stabilized when movement of the pavement is not detected.
- D. Continue injection into the soils as needed to refusal or to lift the pavement to a maximum of a 1/4-inch above existing profile.
- E. Take precautions to prevent the intrusion of injected material into any drainage facility and other structures.
- F. Remove any excessive polyurethane material after the nozzle is removed from the hole. Push down or drill out injection tubing 2 in. below the pavement surface and install a rapid set, non-shrink patching material into the drilled-out holes. Strike patches flush with the surface of the surrounding pavement.
- G. Provide all necessary assistance and cooperation for conducting tests required by Testing Agency.
- H. Site shall be open to usage within 30 min. of final injection of the polyurethane material since material is at a minimum 90% strength within 30 min. Pavement must be free of debris and swept clean prior to opening for usage.
- I. It is understood that, before start of Work, Contractor has examined site, Contract Documents, records of existing utilities, and subsurface investigation report. No additional payments will be allowed due to lack of familiarization with available documents and known conditions.
- J. Contractor shall use equipment of adequate capacity and proven methods for all Work. Only labor and supervisory personnel experienced in this type of Work shall be employed.

3.7 FIELD QUALITY CONTROL BY TESTING AGENCY

- A. All testing to determine specification compliance will be provided by Testing Agency.
- B. Minimum of 6 test locations will be established by soils Engineer/Architect within treatment areas, depending upon response during ground treatment. These test locations will be generally located at midpoint of injection hole patterns.

END OF SECTION 31 45 01

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FRANK CROWLEY COURTS BUILDING REPAIRS

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TEXAS REGISTERED ENGINEERING FIRM F-004168



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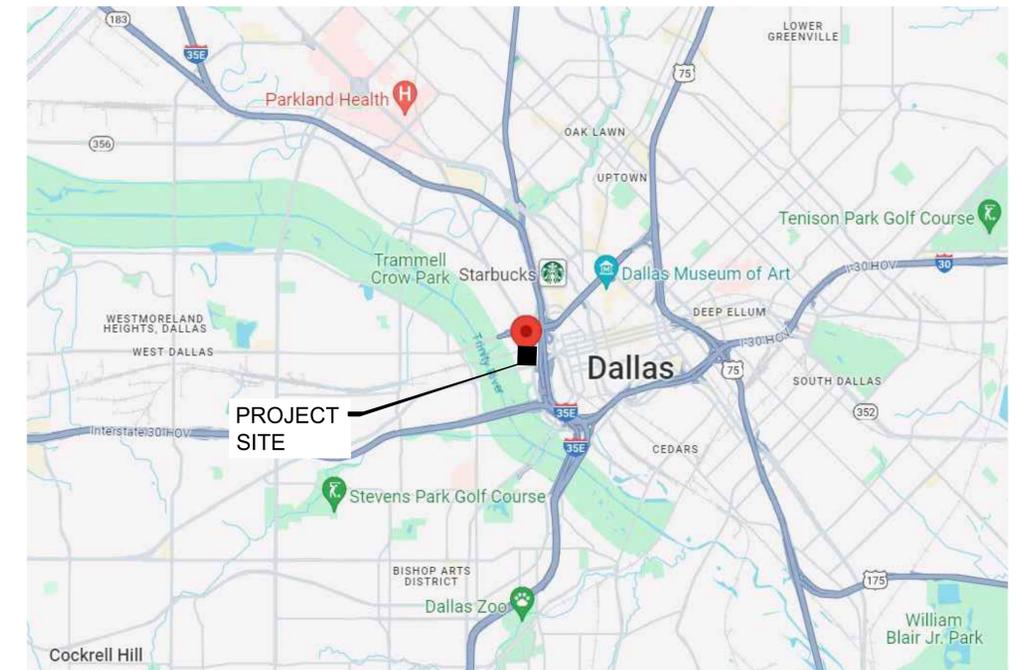


IMAGE SOURCE: GOOGLE MAPS

LOCATION MAP 



06/12/2025
Anirudh S. Goel

Texas Registered Engineering Firm F-004168

ADDENDUM 3
06/12/2025

GENERAL

- INFORMATION SHOWN REGARDING EXISTING STRUCTURE USED IN THE DEVELOPMENT OF THESE DRAWINGS AND NOTES HAS BEEN BASED UPON THE DRAWINGS PROVIDED TO WALKER CONSULTANTS (WALKER).
- PROVIDE NECESSARY PROTECTION/CONTAINMENT AND DISPOSAL MEASURES TO COMPLETE THE WORK.
- VERIFY DIMENSIONS AND CONDITIONS IN THE FIELD. DO NOT SCALE DRAWINGS. DIMENSIONS SHOWN ON THE DRAWINGS ARE TAKEN FROM THE ORIGINAL CONSTRUCTION DOCUMENTS AND ARE PROVIDED FOR INFORMATION ONLY.
- VERIFY QUANTITIES, QUANTITIES SHOWN ARE FOR ESTIMATING PURPOSES ONLY. VERIFY EXISTING CONDITIONS AT THE JOB SITE PRIOR TO STARTING THE WORK AND IMMEDIATELY NOTIFY WALKER OF ANY DISCREPANCIES, OMISSIONS, OR OTHER CONDITIONS THAT MAY AFFECT THE SCOPE OF WORK PRIOR TO BEGINNING REPAIRS RELATED TO THE NOTED CONDITIONS.
- COMPLY WITH THE RULES AND REGULATIONS APPLICABLE TO THE DALLAS COUNTY, THE STATE OF TEXAS, OSHA, AND AUTHORITIES HAVING JURISDICTION.
- LEAVE INTACT AND UNDISTURBED ELEMENTS THAT ARE TO REMAIN.
- FURNISH AND PAY FOR ALL LABOR, MATERIALS, AND EQUIPMENT AS REQUIRED TO COMPLETE THE WORK. SECURE AND PAY FOR PERMITS, LICENSES AND GOVERNMENT FEES AS REQUIRED. COMPLY WITH CODES, ORDINANCES, RULES, REGULATIONS, ORDERS, AND OTHER LEGAL REQUIREMENTS OF PUBLIC AUTHORITY, WHICH BEAR ON THE PERFORMANCE OF THE WORK.
- PROMPTLY SUBMIT VERBAL AND WRITTEN NOTICE TO WALKER OF OBSERVED VARIANCE OF THE CONTRACT DOCUMENTS FROM ACTUAL ON-SITE CONDITIONS.
- SUPPLY THE OWNER WITH MATERIAL SAFETY DATA SHEETS (MSDS) FOR EACH CHEMICAL THAT WILL BE BROUGHT ON TO THE JOB SITE AND SHALL COMPLY WITH THE REQUIREMENTS OF THE OSHA HAZARD COMMUNICATION STANDARD.
- SUBMIT DEMOLITION AND CONSTRUCTION SCHEDULES TO THE OWNER AND WALKER FOR APPROVAL PRIOR TO BEGINNING DEMOLITION.
- THE PRODUCTS SPECIFIED ARE BELIEVED TO HAVE PROPERTIES ADEQUATE FOR SUCCESSFUL COMPLETION OF THE WORK. IF THE CONTRACTOR HAS FOUND THESE PRODUCTS TO BE UNACCEPTABLE OR HAS DIFFICULTY USING THESE MATERIALS, IMMEDIATELY INFORM WALKER.
- WALKER WILL NOT HAVE CONTROL, OVER OR CHARGE OF AND WILL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES, OR FOR SAFETY PRECAUTIONS AND SAFETY PROGRAMS IN CONNECTION WITH THE PROJECT. SINCE THESE ARE THE RESPONSIBILITY OF OTHERS, WALKER WILL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S SCHEDULES OR FAILURE TO CARRY OUT THE PROJECT IN ACCORDANCE WITH CONTRACT DOCUMENTS. WALKER WILL NOT HAVE CONTROL, OVER OR CHARGE OF ACTS OR OMISSIONS OF THE CONTRACTOR, SUB-CONTRACTORS, OR THEIR AGENTS OR EMPLOYEES, OR OF OTHER NON-WALKER PERSONS PERFORMING PORTIONS OF THE PROJECT.
- LIMIT ON-SITE STORAGE OF MATERIALS TO THOSE AREAS IDENTIFIED BY THE OWNER. DO NOT UNREASONABLY ENCUMBER THE SITE WITH MATERIALS OR EQUIPMENT. DO NOT LOAD THE STRUCTURE WITH WEIGHT THAT WILL ENDANGER THE STRUCTURE. ASSUME FULL RESPONSIBILITY FOR THE PROTECTION AND SAFEKEEPING OF PRODUCTS STORED ON THE PREMISES. MOVE STORED MATERIAL OR PRODUCTS THAT INTERFERE WITH THE OPERATIONS OF THE OWNER. ONLY STORE MATERIAL IN AREAS PROVIDED BY THE OWNER.
- TAKE WATER AND ELECTRICITY ONLY FROM AREAS IDENTIFIED BY THE OWNER.
- PROVIDE AND MAINTAIN REQUIRED DUST BARRIERS, CANOPIES, BARRICADES, PROTECTION AND WARNING LIGHTS IN GOOD CONDITION UNTIL THE COMPLETION OF THE WORK REQUIRING SUCH PROTECTION AND THEN REMOVE THE SAME. CANOPIES AND BARRICADES SHALL COMPLY WITH FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS.
- MAINTAIN PREMISES FREE FROM ACCUMULATIONS OF WASTE MATERIAL AND RUBBISH. REMOVE AND DISPOSE OF IN A PROPER MANNER (OFF-SITE) EXISTING MATERIAL REMOVED FROM THE BUILDING DURING THE COURSE OF THE WORK ON A DAILY BASIS. REMOVAL AND DISPOSAL SHALL BE SATISFACTORY TO THE ENGINEER AND THE OWNER.
- RETURN DAMAGED AREAS TO ORIGINAL CONDITIONS.
- COSTS CAUSED BY ILL-TIMED WORK, DEFECTIVE WORK OR WORK NOT CONFORMING TO THE CONTRACT DOCUMENTS, ARE THE RESPONSIBILITY OF THE CONTRACTOR.
- PROVIDE SHORING, BRACING AND SUPPORT AS REQUIRED TO MAINTAIN THE STRUCTURAL INTEGRITY OR THE EXISTING CONSTRUCTION DURING THE WORK. CONSTRUCTION DEBRIS SHALL BE REMOVED IN A MANNER THAT AVOIDS OVERLOADING ADJACENT STRUCTURAL MEMBERS.
- THE CONTRACTOR AND RESPECTIVE SUB-CONTRACTORS SHALL EACH HAVE FIVE OR MORE YEARS EXPERIENCE PERFORMING REPAIR WORK SIMILAR IN SIZE, TYPE, AND COMPLEXITY TO WHAT IS SHOWN IN THE CONTRACT DOCUMENTS.
- WHERE A DETAIL IS SHOWN FOR ONE CONDITION, IT SHALL APPLY FOR ALL LIKE OR SIMILAR CONDITIONS EVEN THOUGH NOT SPECIFICALLY MARKED ON DRAWINGS.
- CONSTRUCTION SHALL BE SUBJECT TO REVIEW BY WALKER BEFORE IT IS CONCEALED FROM VIEW. COORDINATE EXPECTED REVIEW ITEMS WITH WALKER PRIOR TO THE START OF CONSTRUCTION AND PROVIDE REASONABLE NOTIFICATION TO WALKER TO ALLOW FOR SUCH REVIEW AS THE WORK PROCEEDS.
- COORDINATE USE OF PREMISES UNDER THE DIRECTION OF THE OWNER. DO NOT BLOCK EXISTING MEANS OF EGRESS. MAINTAIN SAFE ACCESS TO AND EGRESS FROM THE BUILDING AT ALL TIMES. CONTRACTOR SHALL BE RESPONSIBLE FOR COSTS RESULTING FROM WORK STOPPAGES OR DELAYS CAUSED BY CONTRACTORS' LACK OF COORDINATION WITH THE OWNER.
- PROPERLY PROTECT AND MAKE SAFE ADJACENT PROPERTIES AND RESIDENTS' PROPERTY AS JOB CONDITIONS REQUIRE.
- WALKER IS NOT RESPONSIBLE FOR CONSTRUCTION THAT VARIES FROM THE WORK ILLUSTRATED AND SPECIFIED IN THE CONTRACT DOCUMENTS.
- THE CONTRACTOR IS RESPONSIBLE FOR ELEMENTS OF CONSTRUCTION NOT SPECIFICALLY DETAILED THAT ARE NECESSARY TO COMPLETE THE WORK SHOWN.
- IN THE EVENT OF CONFLICT BETWEEN THE DRAWINGS, NOTIFY WALKER.
- ANY REQUESTS FOR SUBSTITUTION OR CHANGES TO THE REPAIRS NEEDS TO BE SUBMITTED TO WALKER FOR REVIEW DURING THE PROCUREMENT PROCESS AND PRIOR TO A CONSTRUCTION CONTRACT BEING EXECUTED. AFTER A CONSTRUCTION CONTRACT IS EXECUTED, THE CONTRACTOR GUARANTEES THAT THESE DRAWINGS ARE FREE OF ERROR AND COMPLETE TO PERFORM THE WORK WITHOUT CHANGE ORDERS.

CONSTRUCTION

- THE CONTRACTOR SHALL PERFORM WORK IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES, LAWS AND ORDINANCES. THE CONTRACTOR SHALL PROMPTLY NOTIFY WALKER OF ANY KNOWN NONCONFORMITY WITH THE INTENT OF THE CONSTRUCTION DOCUMENTS AND AS-BUILT CONDITIONS TO THE APPLICABLE CODES, LAWS OR ORDINANCES AND REQUEST CLARIFICATION FROM THE ENGINEER PRIOR TO PROCEEDING WITH WORK WHICH IS DEEMED IN CONFLICT WITH THE APPLICABLE CODES, LAWS OR ORDINANCES.
- FIRE SAFETY DURING CONSTRUCTION, ALTERATION OR DEMOLITION SHALL COMPLY WITH 2021 NFPA 7.
- PRIOR TO FABRICATION OF ANY MATERIAL OR PLACEMENT OF CONCRETE, FIELD VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS SHOWN ON DRAWINGS. REPORT ALL DISCREPANCIES TO WALKER IMMEDIATELY.
- DO NOT SCALE DRAWINGS.

CONSTRUCTION DOCUMENTS

- THE EXTENT OF REPAIR AREAS SHOWN ON THE DRAWINGS INDICATES WALKER'S ESTIMATES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL EXTENT AND LOCATIONS OF REPAIR AREAS. THE ACTUAL REPAIR QUANTITIES SHALL BE VERIFIED AND AGREED UPON BY WALKER PRIOR TO COMMENCING THE REPAIR WORK.
- WORK SHALL BE PERFORMED IN COORDINATION WITH CONSTRUCTION OBSERVATIONS BY WALKER TO DETERMINE IF THE EXPOSED EXISTING CONSTRUCTION IS AS ASSUMED IN THE DESIGN.
- DIMENSIONS SHOWN ON PLANS ARE BASED ON ORIGINAL CONSTRUCTION DOCUMENTS. THE CONTRACTOR IS REQUIRED TO FIELD VERIFY ALL CONDITIONS FOR THE PURPOSE OF PERFORMING THE WORK.
- REFER TO SPECIFICATIONS FOR SCOPE, DESCRIPTION AND REQUIREMENTS OF WORK.

DETAILS AND SYMBOLS

- REPAIR DETAILS ARE SHOWN ON DRAWING SERIES R-500, AND ARE IDENTIFIED AS TWO-DIGIT (X,X) DETAILS.
- WHERE THE WORK ITEM BUBBLE IS NOTED "TYP," IT MEANS THE WORK ITEM OCCURS AT ALL LOCATIONS WHERE THE APPLICABLE DETERIORATION OR DESIGNATION SYMBOL OCCURS ON THAT PLAN.
- WHERE "T.A.R." IS NOTED, IT MEANS THERE MAY BE AREAS OF THIS WORK IN ADDITION TO THE PARTICULAR DESIGNATED AREAS.
- WHERE TWO OR MORE WORK ITEM BUBBLES ARE GROUPED TOGETHER, IT MEANS ALL OF THE REFERENCED WORK ITEMS SHALL BE APPLIED.
- WHEN A WORK ITEM OF DETAIL IS LISTED AS INCIDENTAL, THIS WORK IS INCLUDED IN THE PAY UNIT OF OTHER WORK ITEMS AND DOES NOT HAVE A SEPARATE PRICE.
- WHEN A DETAIL IS LABELED (FOR REFERENCE ONLY) IT PROVIDES INFORMATION ONLY ABOUT INCIDENTAL WORK AND DOES NOT HAVE A PAY UNIT.
- CONTRACTOR IS RESPONSIBLE FOR DETERMINING ACTUAL EXTENT AND LOCATIONS OF REPAIR AREAS IN ACCORDANCE WITH THE SPECIFICATIONS; WORK ITEM IS SHOWN ONLY TO REPRESENT THE TYPES OF DETERIORATION. SEE WORK ITEM SPECIFICATION INFORMATION REGARDING DETAILS.

EXAMINATION OF CONTRACT DOCUMENTS AND SITE

- TO WALKER'S KNOWLEDGE, NO OUTSTANDING ENVIRONMENTAL CONCERNS ARE PRESENT ON SITE. IF AN OUTSTANDING ENVIRONMENTAL CONCERN IS IDENTIFIED DURING CONSTRUCTION, THE CONTRACTOR IS TO BRING THIS TO THE ATTENTION OF WALKER AND OWNER.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO FAMILIARIZE ITSELF WITH THE ORIGINAL CONSTRUCTION DRAWINGS FOR THE WORK AREAS. ALL SIGNIFICANT DEVIATIONS ARE TO BE BROUGHT TO THE ATTENTION OF WALKER.

EXISTING SERVICES AND UTILITIES

- CONTRACTOR SHALL REVIEW ALL EXISTING CONDITIONS TO DETERMINE ALL ELECTRICAL AND MECHANICAL SERVICES AND UTILITIES AFFECTED BY THE REPAIR WORK. MAKE NECESSARY TEMPORARY CONNECTIONS TO MAINTAIN EXISTING SERVICES TO ALL AREAS OF THE PARKING GARAGE OR TO OTHER AREAS (NOT IN CONTRACT) AFFECTED BY THE WORK. THE CONTRACTOR SHALL SUBMIT THE METHODS AND SCHEDULE OF CONNECTIONS FOR THE OWNER'S APPROVAL PRIOR TO COMMENCEMENT.

CONSTRUCTION PHASING, SEQUENCING AND TRAFFIC MAINTENANCE

- THE CONTRACTOR IS RESPONSIBLE FOR COLLECTION AND REMOVAL OF ALL CONSTRUCTION DEBRIS ON A DAILY BASIS, AND THE SITE SHALL BE LEFT IN A NEAT AND ORDERLY CONDITION, SATISFACTORY TO THE OWNER.
- THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL ADJACENT STRUCTURES, LANDSCAPING, AND OTHER SURFACES AND ITEMS WHICH COULD BE AFFECTED BY THE WORK.

APPLICABLE CODES AND STANDARDS

ALL WORK SHALL BE IN ACCORDANCE WITH THE CURRENT BUILDING CODE FOR DALLAS COUNTY, TEXAS, INCLUDING ALL LOCAL AMENDMENTS. THE PUBLICATIONS LISTED BELOW ARE THE GOVERNING CODES AND STANDARDS AND ARE REFERENCED BY THE BASIC DESIGNATION. IN THE CASE OF CONFLICTING REQUIREMENTS, THE BUILDING CODE SHALL GOVERN.

BUILDING CODE	2021 INTERNATIONAL BUILDING CODE
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ACI	AMERICAN CONCRETE INSTITUTE
ASTM	ASTM INTERNATIONAL
NRCA	NATIONAL ROOFING CONTRACTORS ASSOCIATION, ROOFING AND WATERPROOFING MANUAL
SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION INC., SMANCA MANUAL
OSHA	OCCUPATIONAL SAFETY AND HEALTH ACT
ADA	AMERICANS WITH DISABILITIES ACT

WELDING

- WHERE WELDING OF REINFORCING BARS IS APPROVED BY WALKER, IT SHALL BE DONE BY AWS CERTIFIED WELDERS USING E70XX OR APPROVED ELECTRODES. WELDING PROCEDURES SHALL CONFORM TO THE REQUIREMENTS OF THE "STRUCTURAL WELDING CODE - STEEL", AWS-D14

PROTECTION OF EXISTING UTILITIES AND STRUCTURES

SUBSURFACE OBSTRUCTIONS: TAKE NECESSARY PRECAUTIONS TO PROTECT EXISTING UTILITIES FROM DAMAGE DUE TO ANY CONSTRUCTION ACTIVITY. THE CONTRACTOR SHALL LOCATE EXISTING UTILITIES, CULVERTS, AND STRUCTURES (ABOVE OR BELOW GROUND), BEFORE ANY EXCAVATION STARTS AND COORDINATE WORK WITH UTILITY COMPANIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING UTILITY COMPANIES WHEN WORKING WITHIN THE VICINITY OF THE EXISTING UTILITIES. OMISSION FROM OR INCLUSION OF LOCATED UTILITY ITEMS ON PLANS DO NOT CONSTITUTE NON-EXISTENT OR DEFINITE LOCATION. SECURE AND EXAMINE LOCAL UTILITY SURVEYOR RECORDS FOR AVAILABLE LOCATION DATA INCLUDING BUILDING SERVICE LINES.

UNLESS SHOWN TO BE REMOVED, PROTECT ACTIVE UTILITY LINES SHOWN ON THE DRAWINGS OR OTHERWISE MADE KNOWN TO THE CONTRACTOR PRIOR TO TRENCHING. IN EXCAVATING, CARE MUST BE TAKEN NOT TO REMOVE OR INJURE ANY SUBSURFACE STRUCTURE. ALL EXISTING GAS PIPES, WATER PIPES, STEAM PIPES, TELEPHONE LINES, CABLE TV LINES, ELECTRICAL CONDUITS, SEWERS, DRAINS, FIRE HYDRANTS, AND OTHER STRUCTURES WHICH, IN THE OPINION OF THE UTILITY COMPANY, DO NOT REQUIRE RELOCATION SHALL BE CAREFULLY SUPPORTED, SHORED UP, THE FLOW MAINTAINED, IF APPLICABLE, AND THE LINE/MAIN PROTECTED. THE UTILITY SHALL BE RESTORED, AT THE CONTRACTOR'S EXPENSE, BY THE APPROPRIATE UTILITY TO ORIGINAL OR BETTER CONDITION. WHERE PIPES, CONDUITS, OR SEWERS ARE REMOVED FROM A TRENCH LEAVING DEAD ENDS IN THE GROUND, SUCH ENDS SHALL BE CAREFULLY PLUGGED OR BULKHEADED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO PERSONS OR PROPERTY CAUSED BY SUCH BREAKS.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANTICIPATING AND LOCATING UNDERGROUND UTILITIES AND OBSTRUCTIONS. WHEN CONSTRUCTION APPEARS TO BE IN CLOSE PROXIMITY TO EXISTING UTILITIES, THE TRENCH(ES) SHALL BE OPENED A SUFFICIENT DISTANCE AHEAD OF THE WORK OR TEST PITS MADE TO VERIFY THE EXACT LOCATIONS AND INVERTS OF THE UTILITY TO ALLOW FOR CHANGES IN LINE AND GRADE.

IF ACTIVE UTILITY LINES ARE ENCOUNTERED, ARE NOT SHOWN ON THE DRAWINGS OR OTHERWISE MADE KNOWN TO THE CONTRACTOR, PROMPTLY TAKE NECESSARY STEPS TO ASSURE THAT SERVICE IS NOT INTERRUPTED.

TESTING AND INSPECTION REQUIREMENTS

- THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS WITH THE ENGINEER.
- THE CONTRACTOR SHALL SECURE THE SERVICES OF AN INDEPENDENT TESTING AND INSPECTION AGENCY TO PERFORM ALL REQUIRED MATERIAL TESTS AND INSPECTIONS, WHERE APPLICABLE. AGENCY SHALL BE EMPLOYED BY CONTRACTOR, AND APPROVED BY ENGINEER AND BUILDING OFFICIAL. TEST AND INSPECTION REPORTS SHALL BE SUBMITTED FOR APPROVAL TO ENGINEER AND BUILDING OFFICIAL, AND CONFORM TO REQUIREMENTS OF THE 2021 IBC.
- SPECIAL INSPECTOR SHALL KEEP RECORDS OF INSPECTIONS. THE SPECIAL INSPECTOR SHALL FURNISH INSPECTION REPORTS TO THE OWNER, LICENSED ENGINEER OF RECORD AND OTHER DESIGNATED PERSONS.
- IN THE EVENT THAT ELEMENTS, MEMBERS, OR CONNECTIONS DO NOT ACHIEVE THE SPECIFIED MINIMUM REQUIREMENTS, THE ENGINEER MAY REQUIRE ADDITIONAL ANALYSIS, TESTING OR REMOVAL AND REPLACEMENT OF MEMBERS. ANY AND ALL SUCH ADDITIONAL ANALYSIS OR TESTING SHALL BE AT THE CONTRACTOR'S EXPENSE. REPLACEMENT OF ANY MEMBERS DEEMED QUESTIONABLE OR INADEQUATE BY THE ENGINEER SHALL BE AT THE CONTRACTOR'S EXPENSE.

FIRE PROTECTION

- THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIRE PROTECTION AND FIRE WATCH DURING ALL CONSTRUCTION OPERATIONS.
- NO SMOKING SHALL BE PERMITTED IN THE BUILDING. CONTRACTOR SHALL PROVIDE AND MAINTAIN TEMPORARY FIRE EXTINGUISHERS UNTIL SUBSTANTIAL COMPLETION.

GENERAL CONCRETE REQUIREMENTS

- PREPACKAGED REPAIR MATERIAL (033760)
 COMPRESSIVE STRENGTH 5000 PSI AT 28 DAYS
 WALKER SHALL BE NOTIFIED A MINIMUM OF 24 HOURS FOR OBSERVATION OF PREPARED CONCRETE SURFACES.
- INSTALL COARSE TRANSVERSE SCORED TEXTURE BY DRAWING BROOM ACROSS SURFACE OF ALL CONCRETE.

CONCRETE PROTECTION FOR REINFORCEMENT:

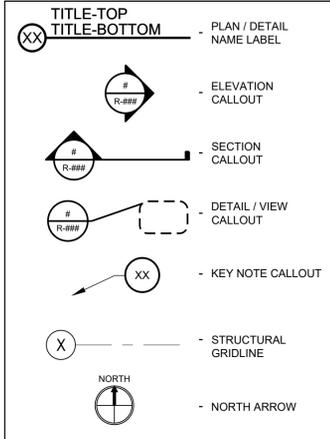
- THE FOLLOWING APPLIES FOR FULL SECTION REPLACEMENT WHERE SHOWN ON DRAWINGS.
- THE MINIMUM CONCRETE PROTECTION FOR REINFORCEMENT SHALL PER ACI 318-19 SECTION 20.6.1.3
- MINIMUM COVER FOR REINFORCING IN NON-PRE-STRESSED CONCRETE AND NON-POST-TENSIONED MEMBERS.

	MINIMUM CONCRETE COVER (INCHES)
(A) CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH	3
(B) CONCRETE EXPOSED TO EARTH OR WEATHER: NO. 6 THROUGH NO. 18 BARS NO. 5 BAR, W31 OR D31 WIRE, AND SMALLER	2 1-1/2
(C) CONCRETE NOT EXPOSED TO WEATHER OR IN CONTACT WITH GROUND: SLABS, WALLS, JOISTS: NO. 14 AND NO. 18 BARS NO. 11 BAR AND SMALLER BEAMS, COLUMNS: PRIMARY REINFORCEMENT, TIES, STIRRUPS, SPIRALS	1-1/2 3/4 1-1/2

SHORING AND BRACING

- CONTRACTOR SHALL PROVIDE ALL SHORING, BRACING, SHEETING, ETC. REQUIRED FOR SAFETY AND PROPER EXECUTION OF THE WORK.
- THE DESIGN OF THE SHORING AND BRACING MEMBERS SHALL INCLUDE ALL CHANGES IN THE STRUCTURE CAUSED BY THE SHORING AND BRACING.
- SHORING MEMBERS SHALL BE ADJUSTABLE, AND THE SHORING SHALL BE INSTALLED TIGHTLY BETWEEN THE FLOOR AND CEILING.
- SHORING SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF TEXAS. CONTRACTOR TO SUBMIT SEALED SHORING DRAWINGS TO WALKER FOR REVIEW.

COMMON SYMBOLS LEGEND



ABBREVIATIONS

CONC.	CONCRETE
C.J.	CONTROL JOINT
C.F.V.	CONTRACTOR FIELD VERIFY
DT	DOUBLE TEE
EQ.	EQUAL
EXIST.	EXISTING
E.J.	EXPANSION JOINT
F.D.	FLOOR DRAIN
IN	INCHES
JT	JOINT
MAX	MAXIMUM
MIN	MINIMUM
O.C.	ON CENTER
O.H.	OVERHEAD
PRE-CAST	PRE-CAST
REINF.	REINFORCEMENT
REQ'D	REQUIRED
SIM.	SIMILAR
TYP.	TYPICAL
T.A.R.	TYPICAL AS REQUIRED
V.I.F.	VERIFY IN FIELD
S.O.G.	SLAB-ON-GRADE
WWR	WELDED WIRE REINFORCEMENT
W.I.	WORK ITEM

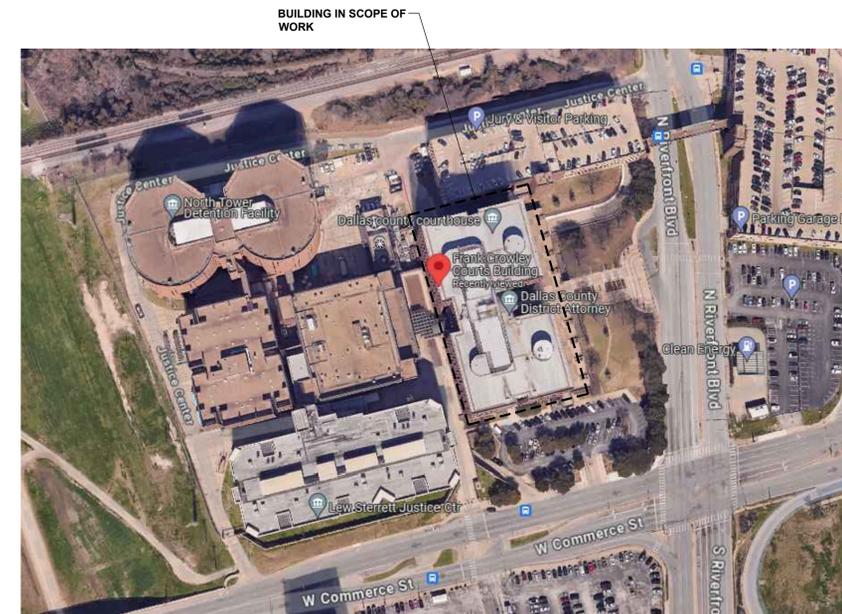


IMAGE SOURCE: GOOGLE MAPS

NORTH



SCHEMATIC SITE PLAN



**FRANK CROWLEY COURTS
BUILDING REPAIRS**

TEXAS

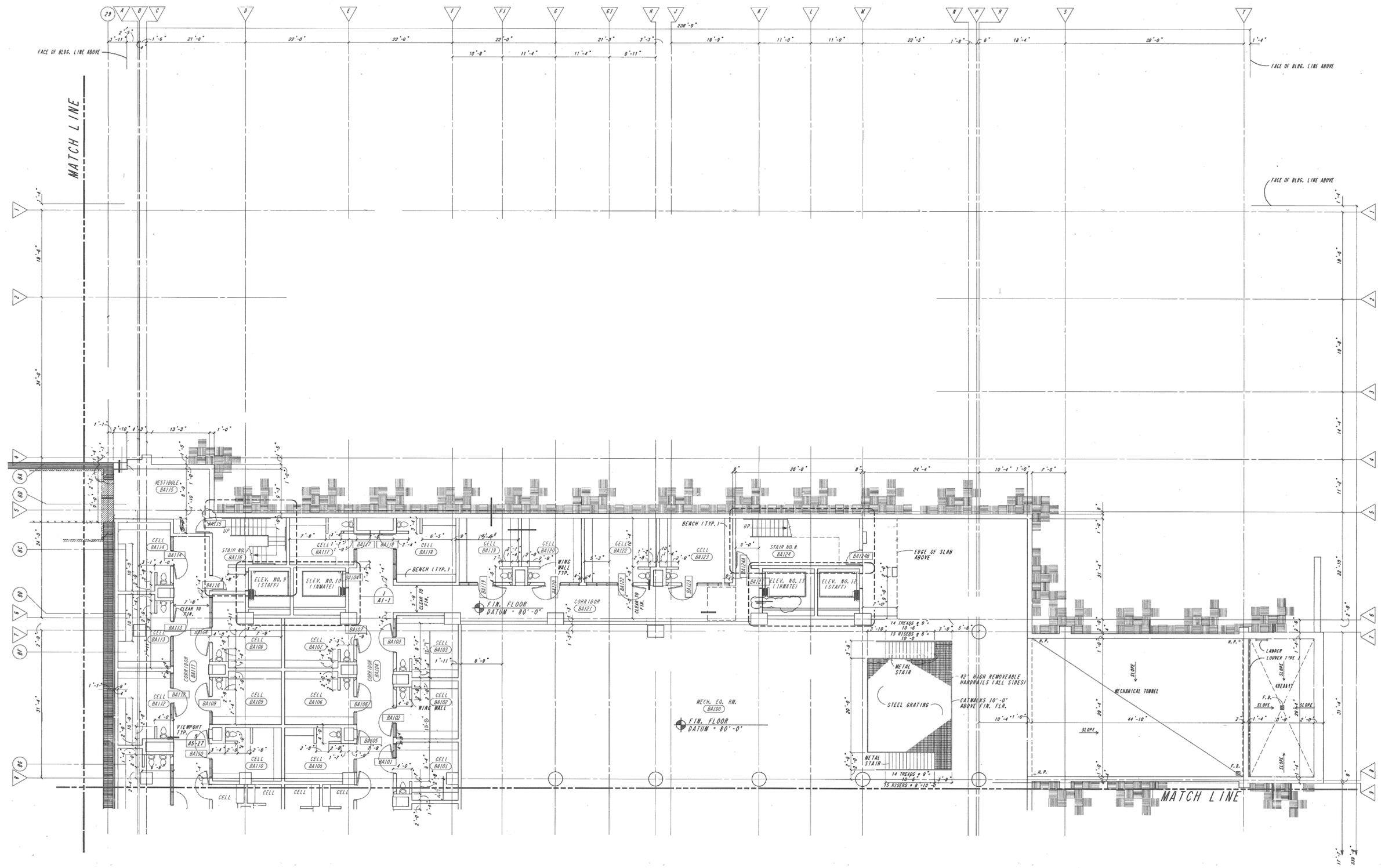
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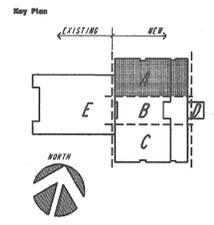
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R-001

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1 BASEMENT LEVEL FLOOR PLAN - AREA A



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 12377 Merit Drive
 Suite 420
 Dallas, TX 75251
 281.280.0066 Ph
 www.walkerconsultants.com

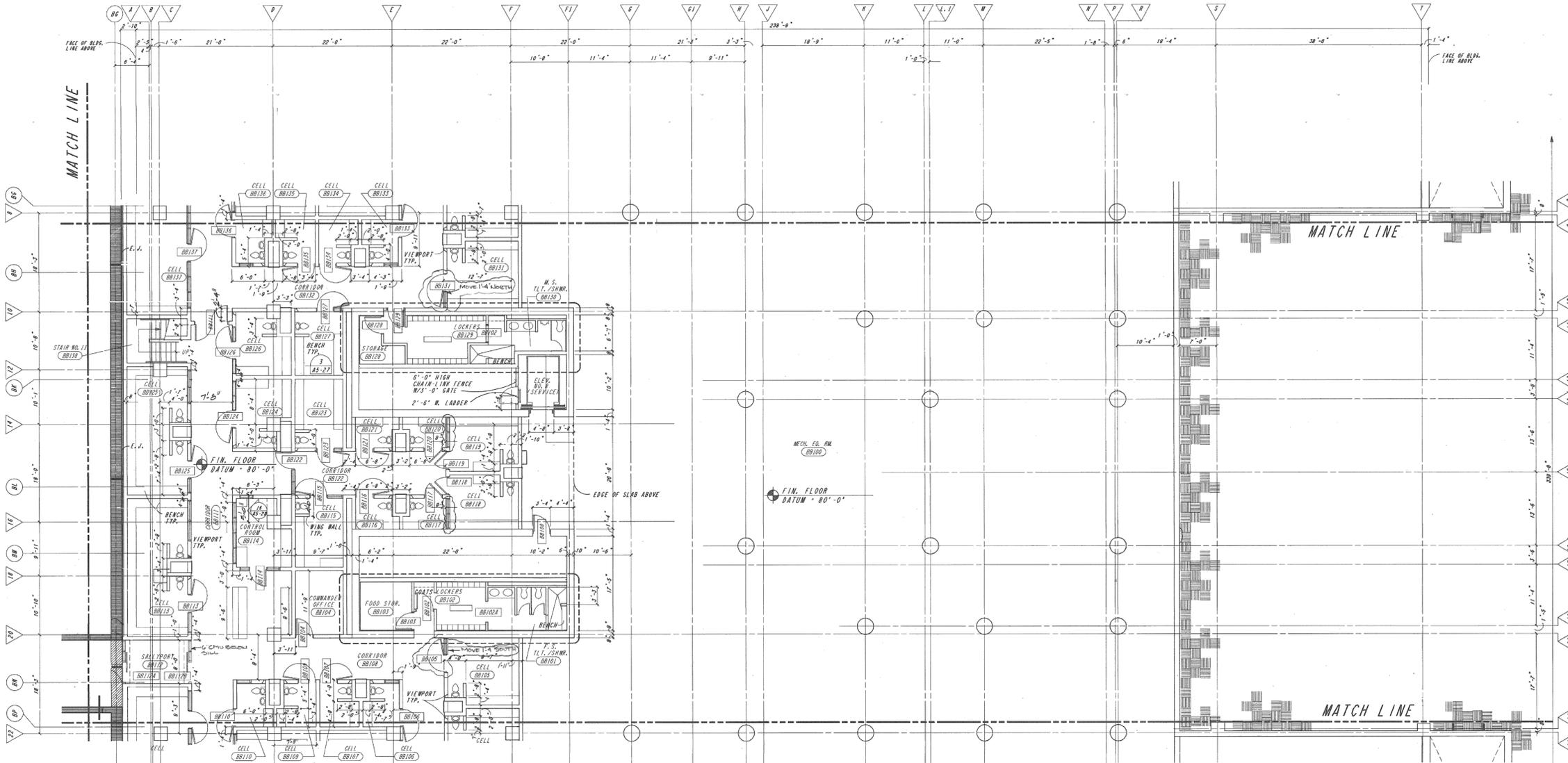
STATE OF TEXAS
ANIRUDH S. GOEL
 145803
 LICENSED PROFESSIONAL ENGINEER
 06/12/2025
Anirudh S. Goel
 Texas Registered Engineering Firm F-004168

**FRANK CROWLEY COURTS
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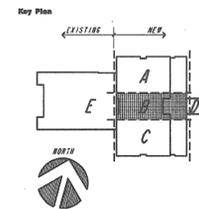
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PROJECT NO: 27-001211.01
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 CHECKED BY: AG
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 FLOOR PLAN -
 AREA A

R-100



1 BASEMENT LEVEL FLOOR PLAN - AREA B

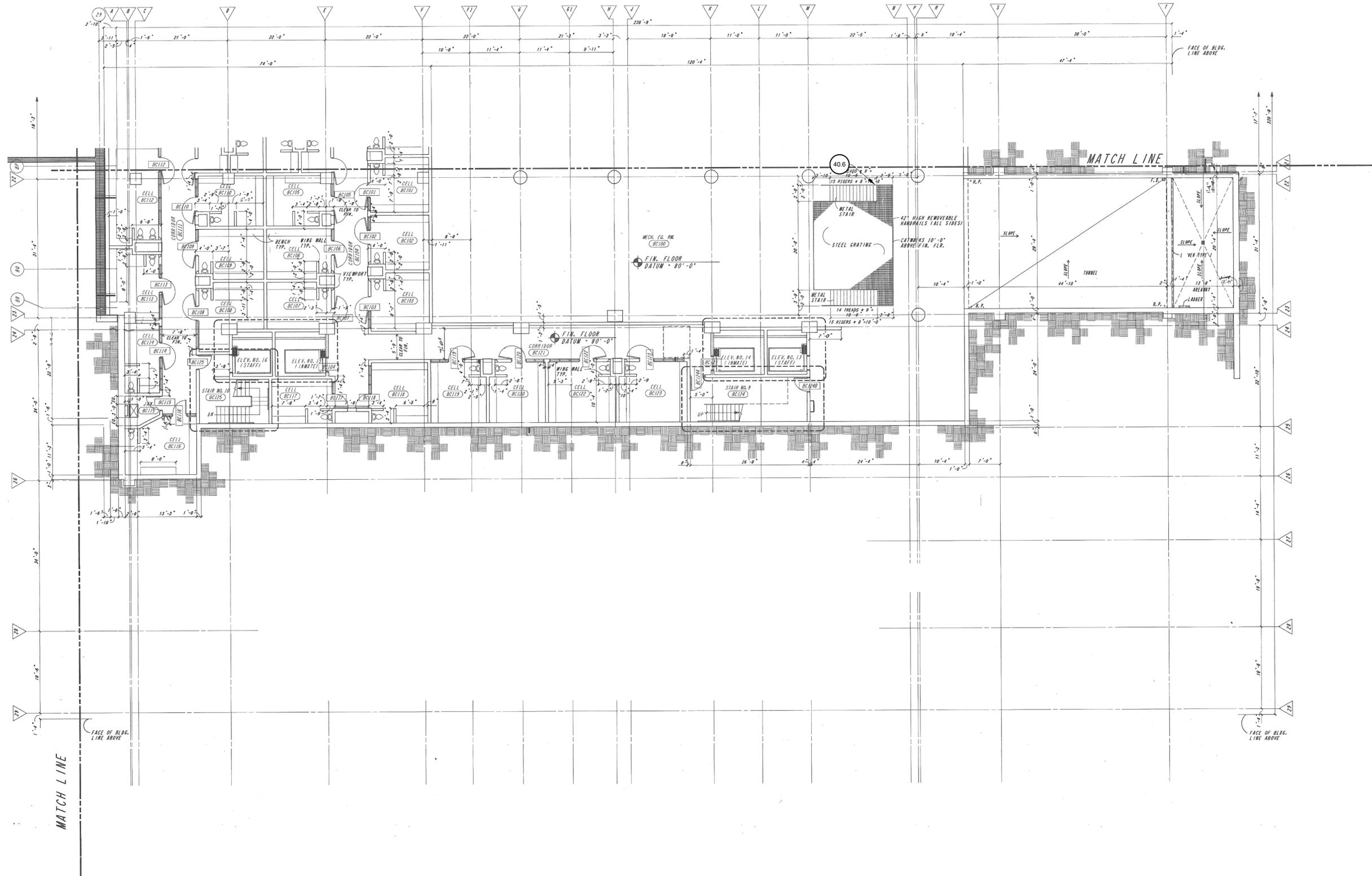


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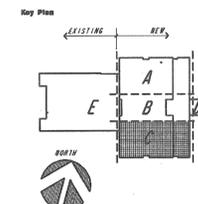
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 CHECKED BY: AG
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 FLOOR PLAN -
 AREA B

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1 BASEMENT LEVEL FLOOR PLAN - AREA C



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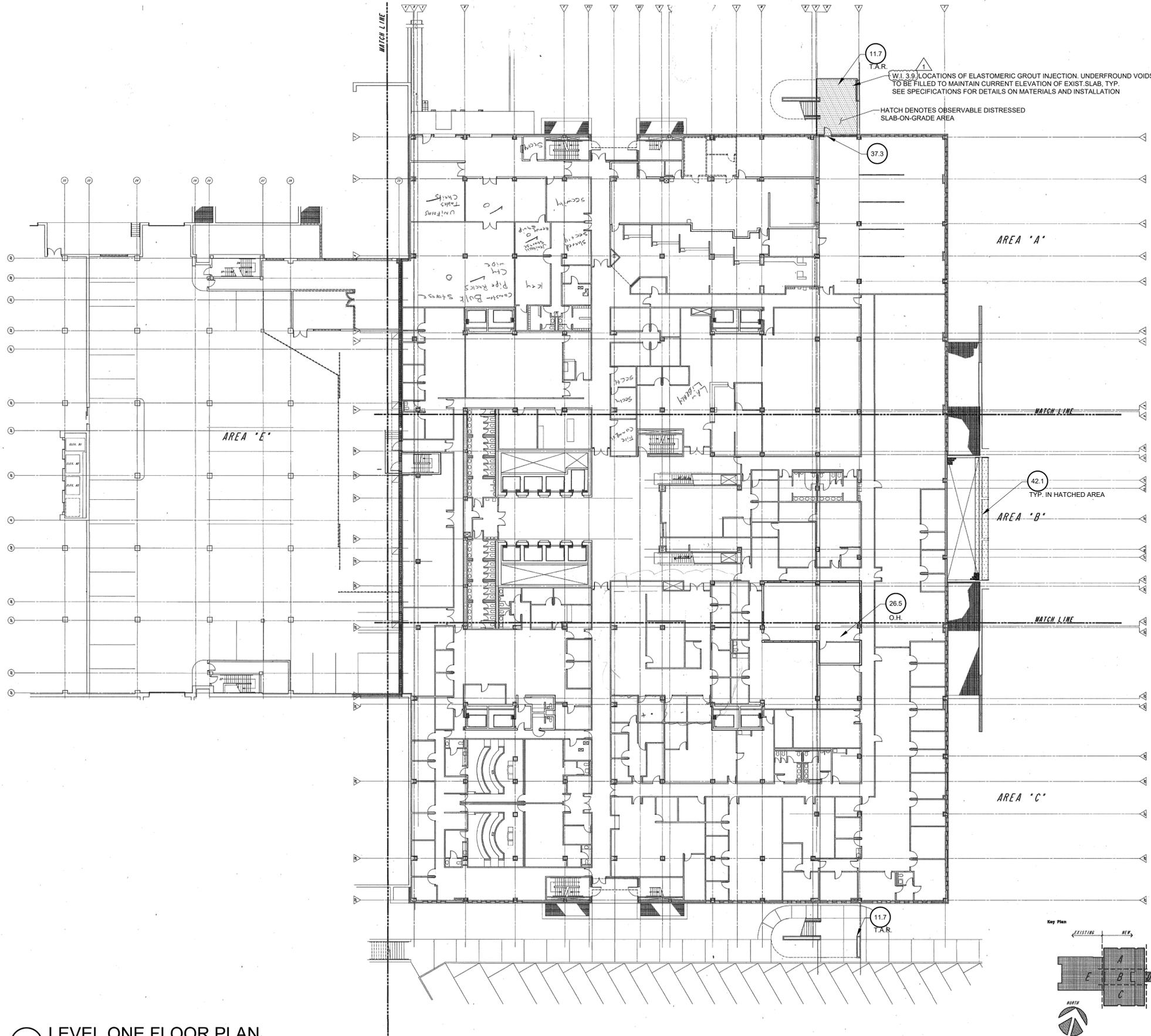
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 FLOOR PLAN -
 AREA C

R-102

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1 LEVEL ONE FLOOR PLAN

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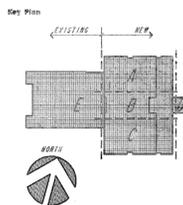
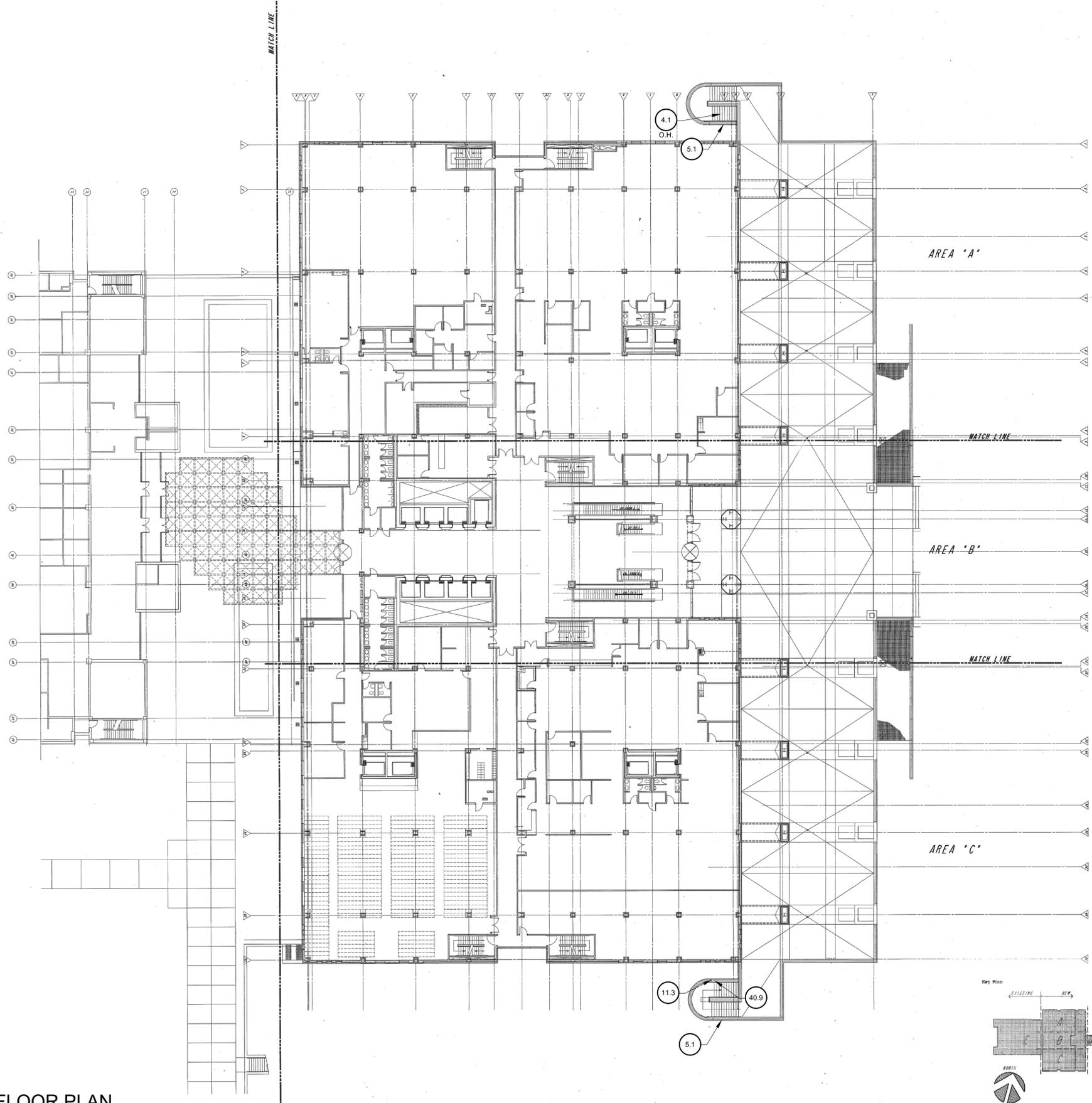
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 CHECKED BY: AG
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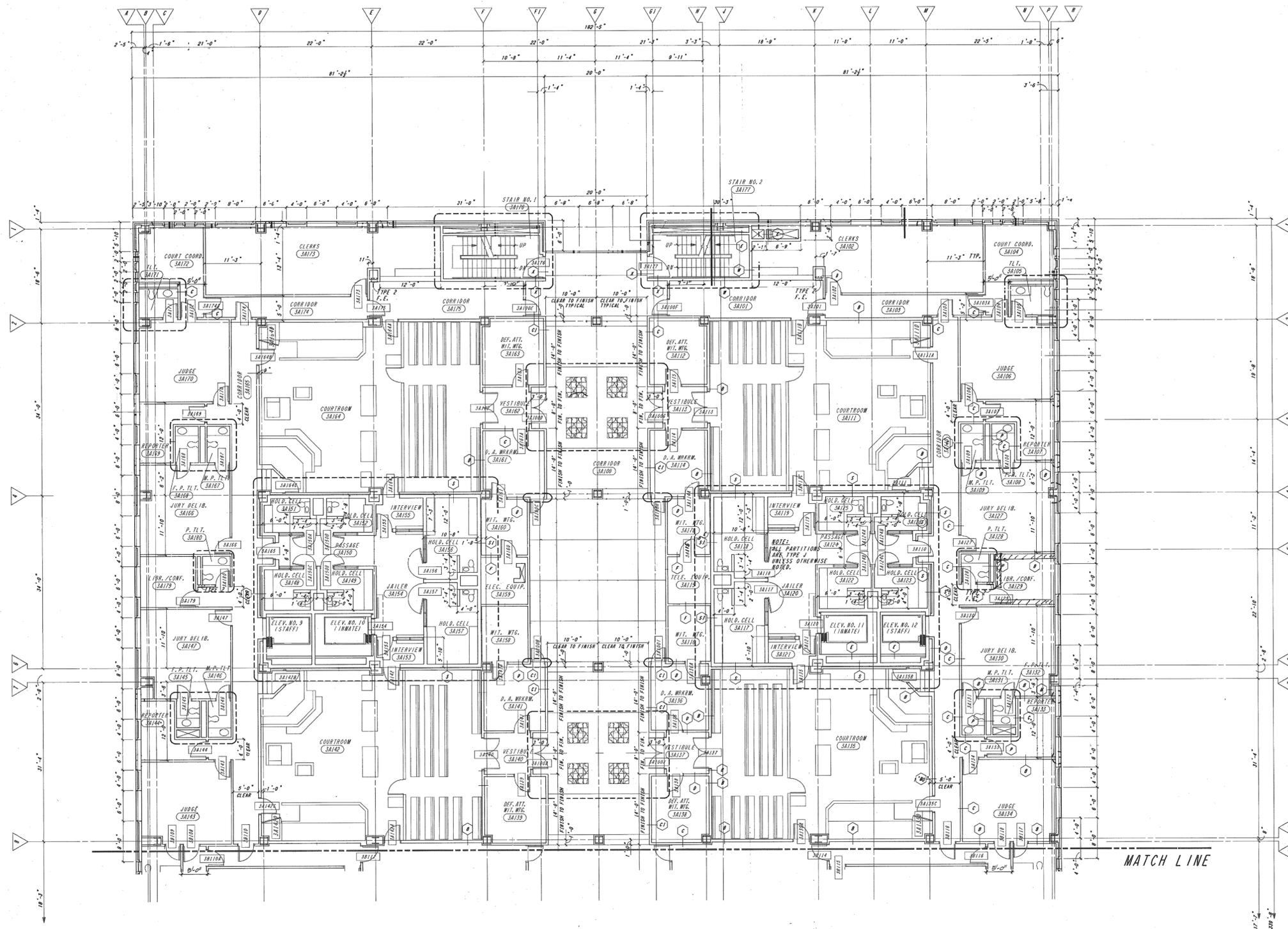
1 LEVEL TWO FLOOR PLAN



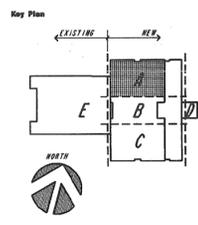
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BUILDING REPAIRS
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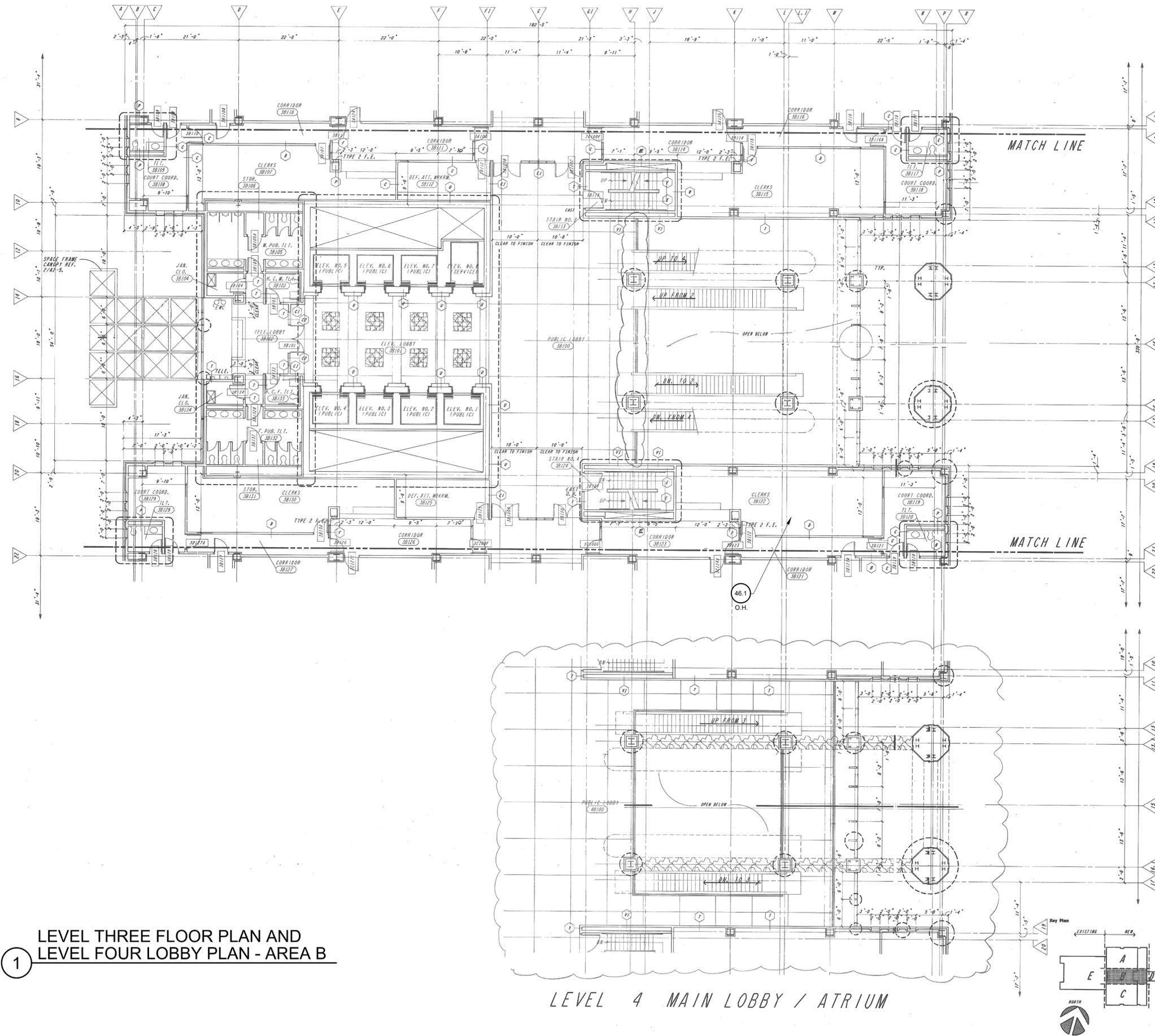
1 LEVEL THREE FLOOR PLAN - AREA A



**FRANK CROWLEY COURTS
 BUILDING REPAIRS**
 TEXAS
 DALLAS

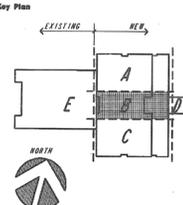
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 DRAWN BY: CC
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 LEVEL THREE -
 FLOOR PLAN -
 AREA A



1 LEVEL THREE FLOOR PLAN AND LEVEL FOUR LOBBY PLAN - AREA B

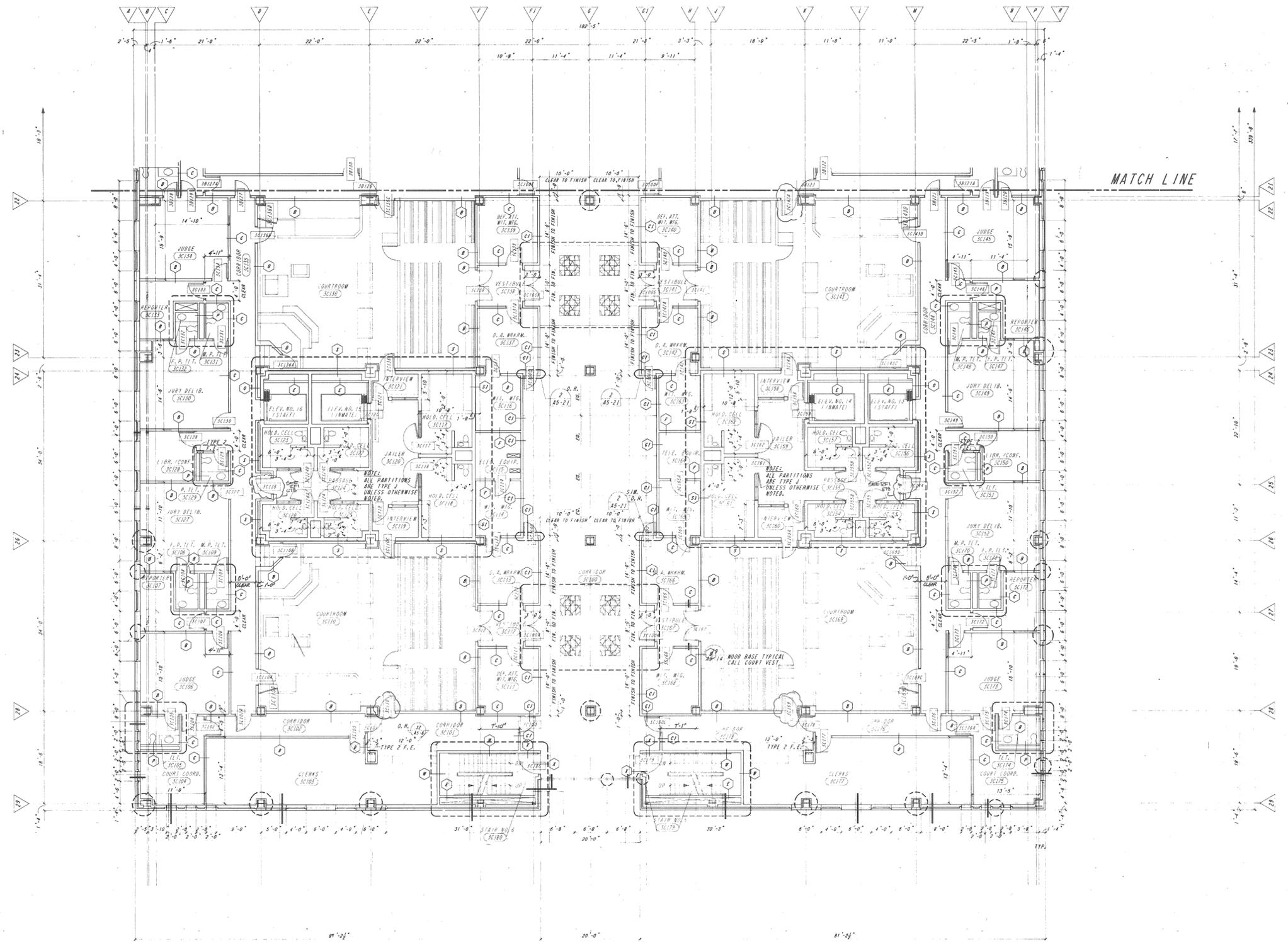
LEVEL 4 MAIN LOBBY / ATRIUM



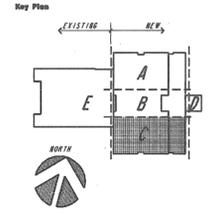
**FRANK CROWLEY COURTS
 BUILDING REPAIRS**
 TEXAS
 DALLAS

MARK	DATE	DESCRIPTION	ISSUED
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B	05/22/2025	ADDENDUM 2	
C	05/05/2025	ADDENDUM 1	
D	08/23/2024	ISSUED FOR BIDDING	

PROJECT NO: 27-001211.01
 DRAWN BY: CC
 CHECKED BY: AG
 SHEET TITLE:
 LEVEL THREE
 FLOOR PLAN AND
 LEVEL FOUR
 LOBBY PLAN



1 LEVEL THREE FLOOR PLAN - AREA C

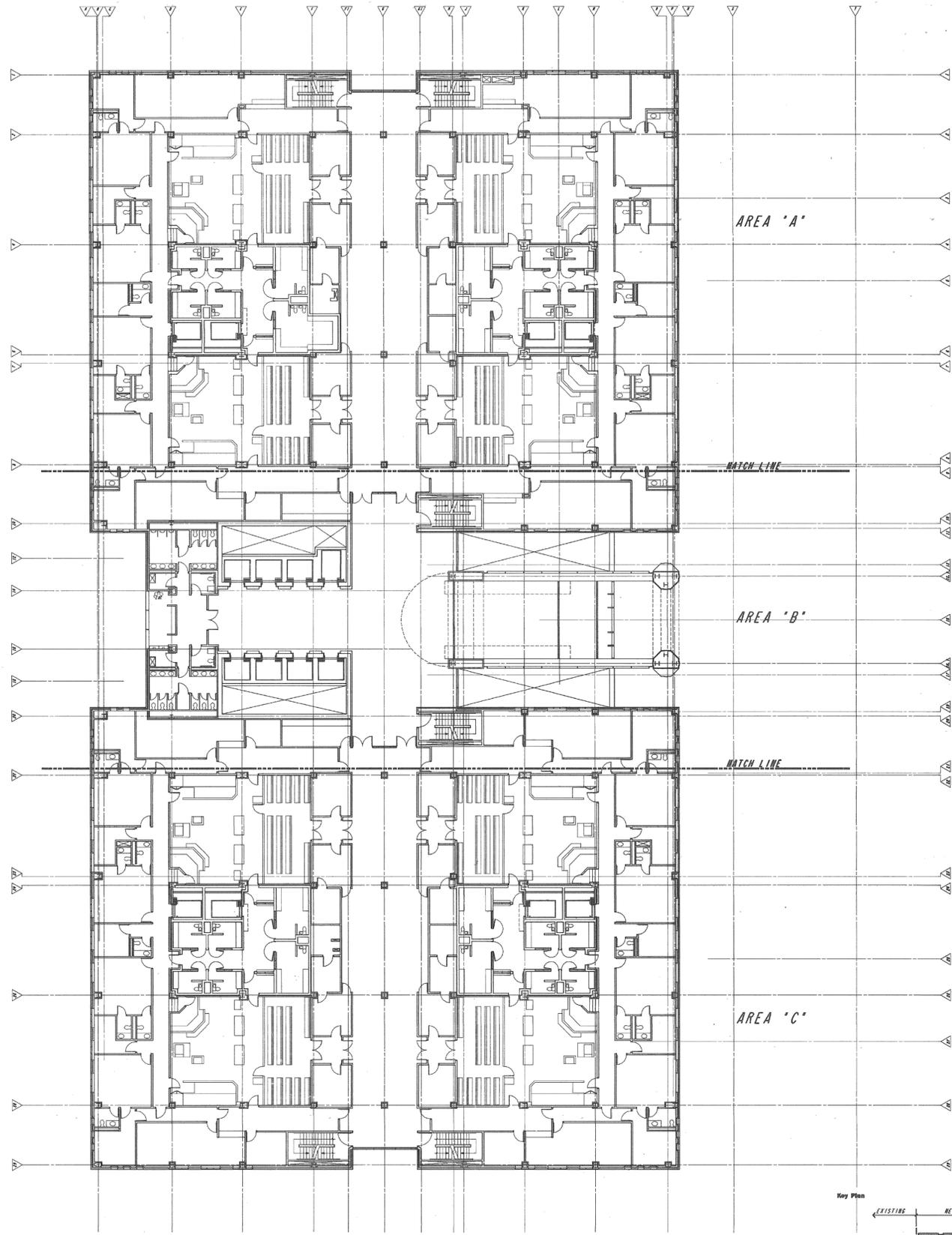


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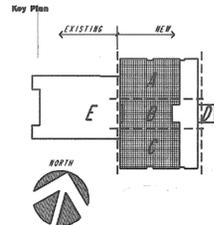
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B	05/22/2025	ADDENDUM 2	
C	05/05/2025	ADDENDUM 1	
D	08/23/2024	ISSUED FOR BIDDING	

PROJECT NO: 27-001211.01
 DRAWN BY: CC
 CHECKED BY: AG
 SHEET TITLE:
 LEVEL THREE -
 FLOOR PLAN

C:\USERS\CHUDIWALL\ONE DRIVE - WALKER CONSULTANTS\PROJECTS\DALLAS COUNTY 4 BUILDING PROJECT\ADDENDUM 3\ACAD\FR-100.DWG 6/12/2025 9:23:06 AM CHUDIWALL, CHAITANYA



1 LEVEL FIVE FLOOR PLAN



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 ANIRUDH S. GOEL
 145803
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 06/12/2025
Anirudh S. Goel
 Texas Registered Engineering Firm F-004168

**FRANK CROWLEY COURTS
 BUILDING REPAIRS**
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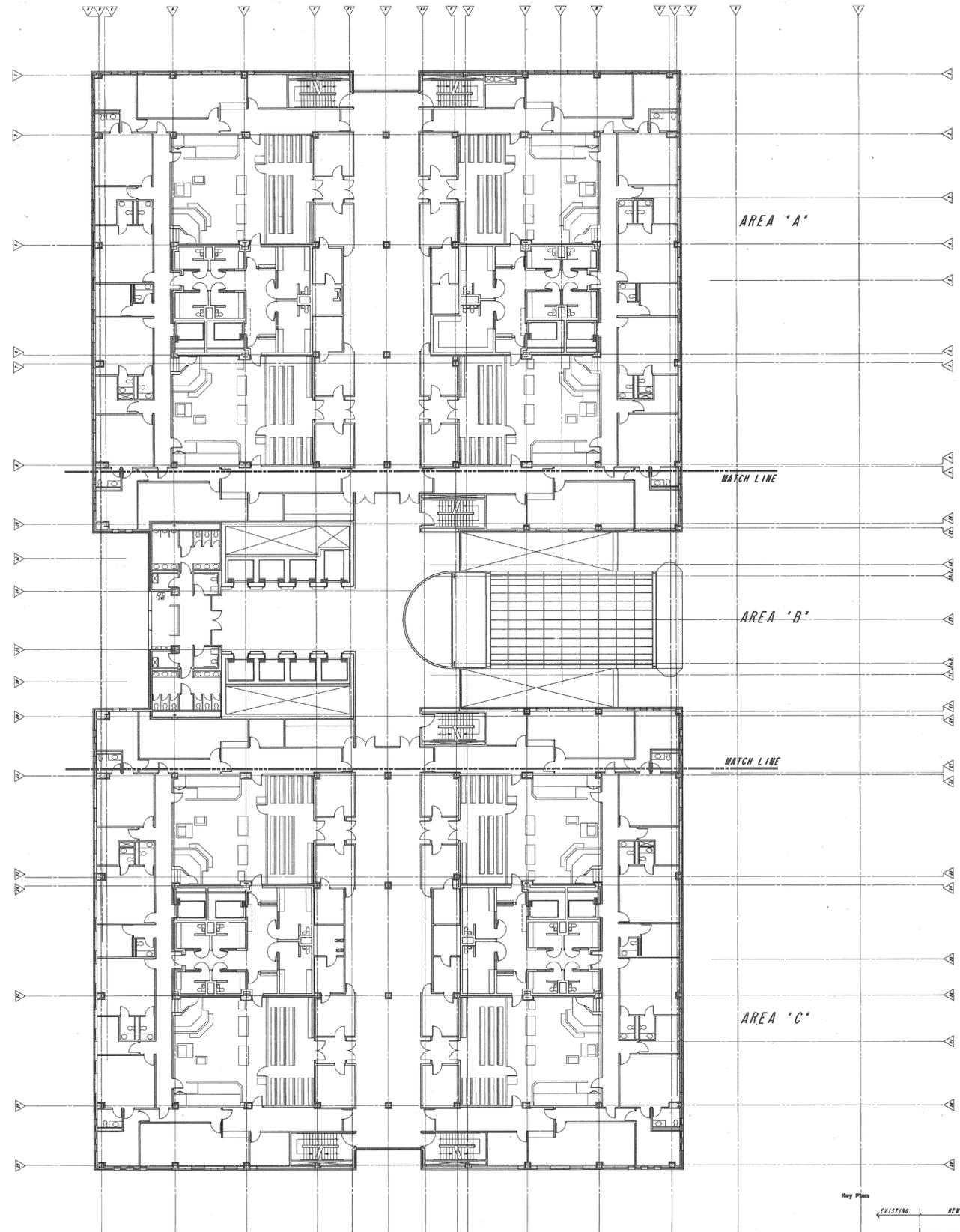
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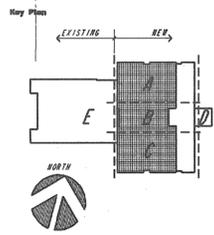
SHEET TITLE:
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 FLOOR PLAN

R-109

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1 LEVEL SIX FLOOR PLAN



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 145803
 06/12/2025
Anirudh S. Goel
 Texas Registered Engineering Firm F-004168

**FRANK CROWLEY COURTS
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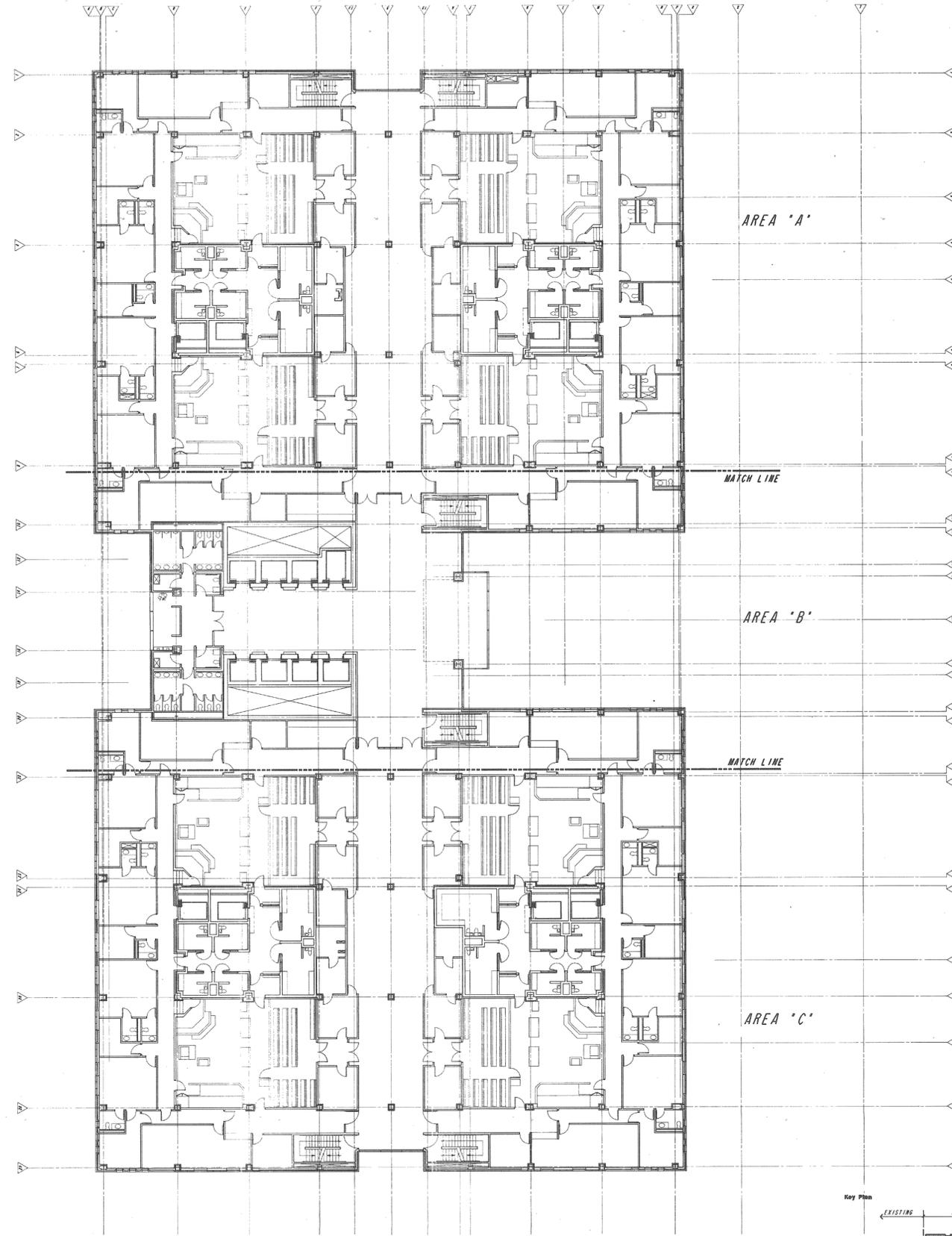
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PROJECT NO: 27-001211.01
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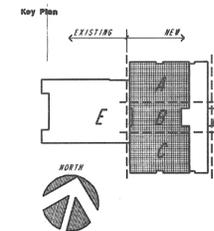
SHEET TITLE:
 LEVEL SIX -
 FLOOR PLAN

R-110

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① LEVEL SEVEN FLOOR PLAN



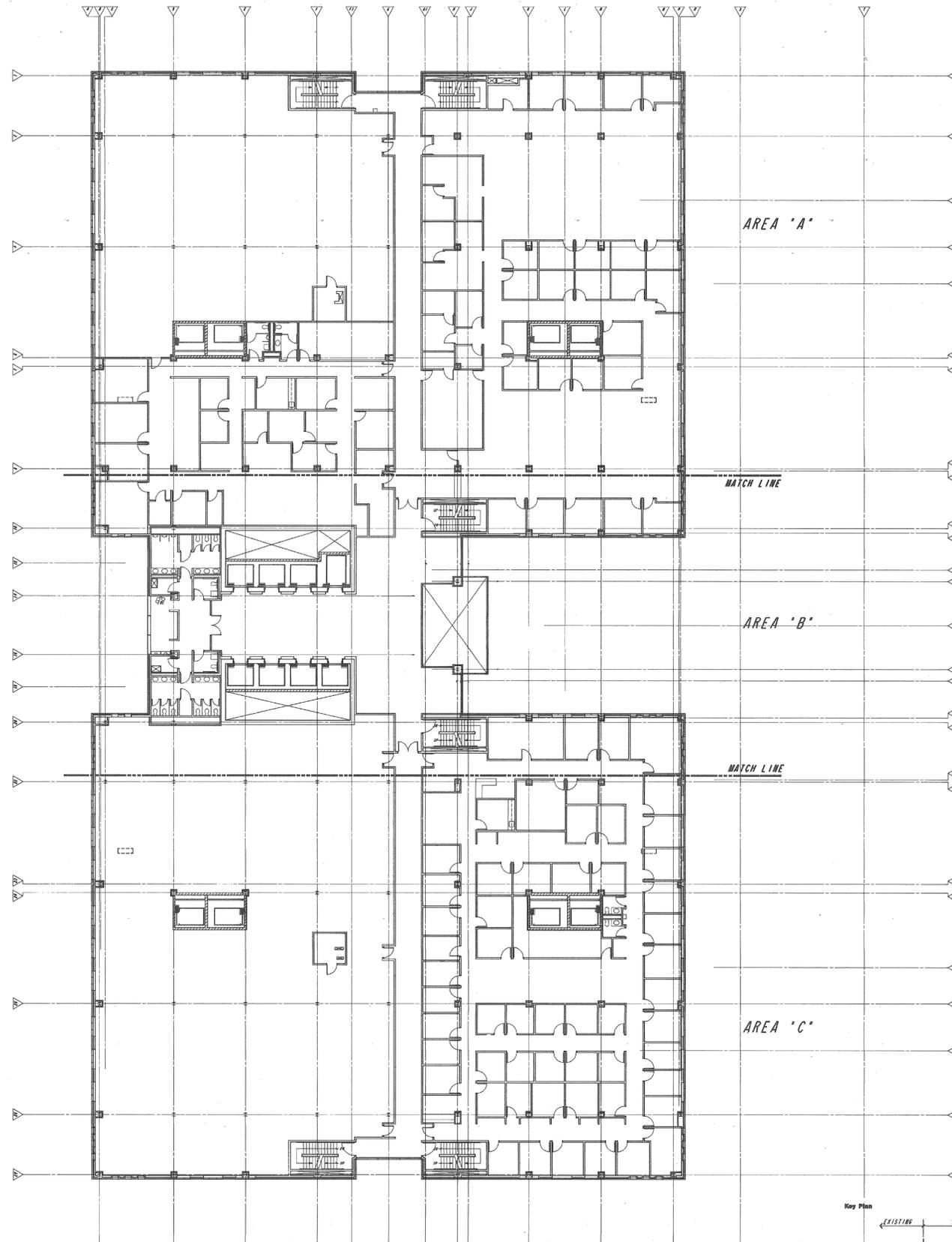
**FRANK CROWLEY COURTS
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 DALLAS TEXAS

MARK	DATE	DESCRIPTION	ISSUED:
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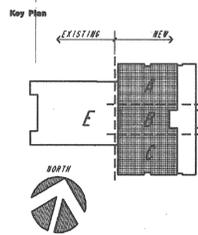
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 DRAWN BY: CC
 CHECKED BY: AG
 SHEET TITLE:
 LEVEL SEVEN -
 FLOOR PLAN

R-111

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1 LEVEL EIGHT FLOOR PLAN



**FRANK CROWLEY COURTS
BUILDING REPAIRS**

DALLAS TEXAS

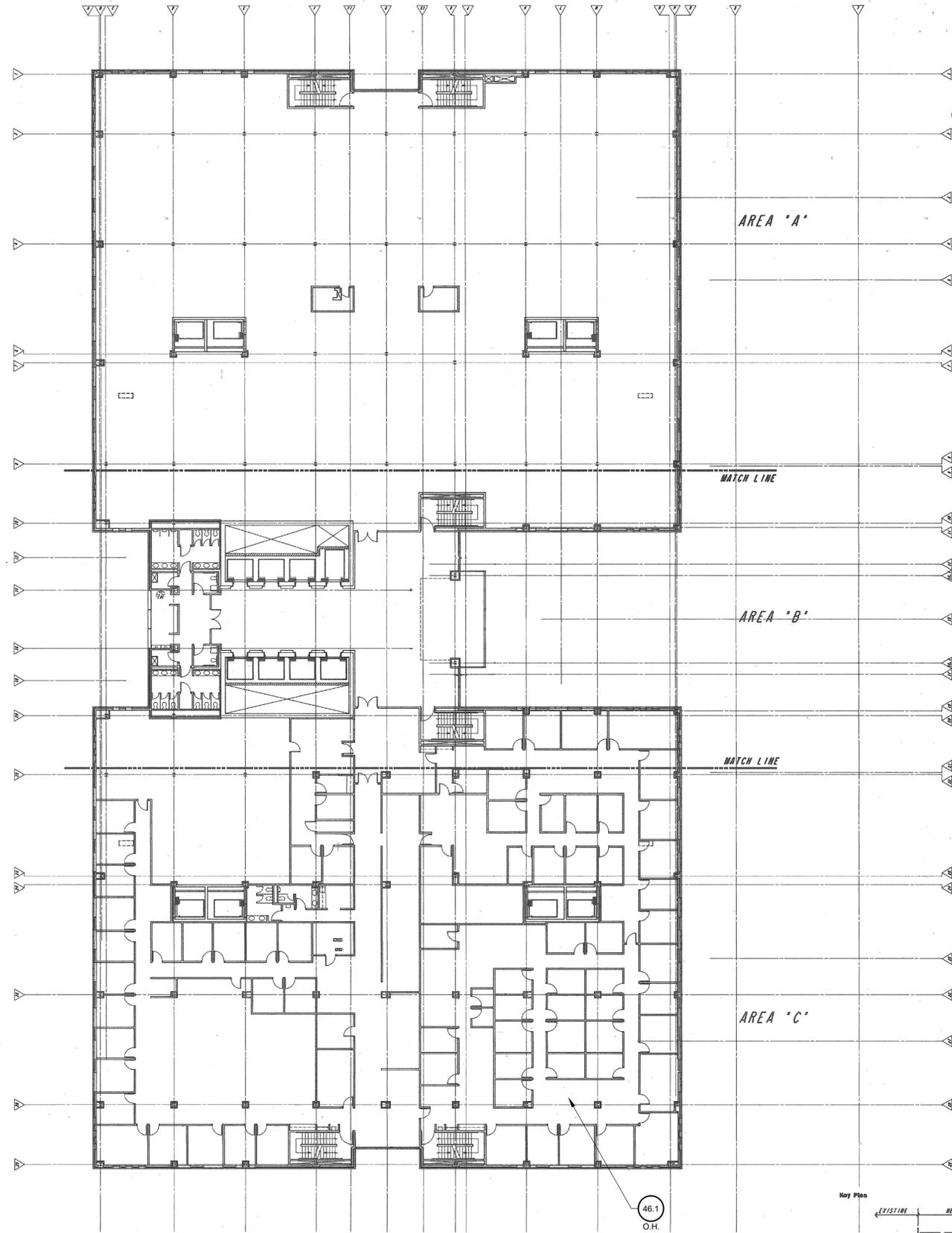
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A	08/23/2024	ISSUED FOR BIDDING	

PROJECT NO: 27-001211.01
 DRAWN BY: CC
 CHECKED BY: AG

SHEET TITLE:
 LEVEL EIGHT -
 FLOOR PLAN

R-112

C:\USERS\CHUDIWALL\ONE DRIVE - WALKER CONSULTANTS\PROJECTS\DALLAS COUNTY 4 BUILDING PROJECT\ADDENDUM 3\ACAD\FR-100.DWG 6/12/2025 9:23:06 AM CHUDIWALL, CHAITANYA



1 LEVEL NINE FLOOR PLAN



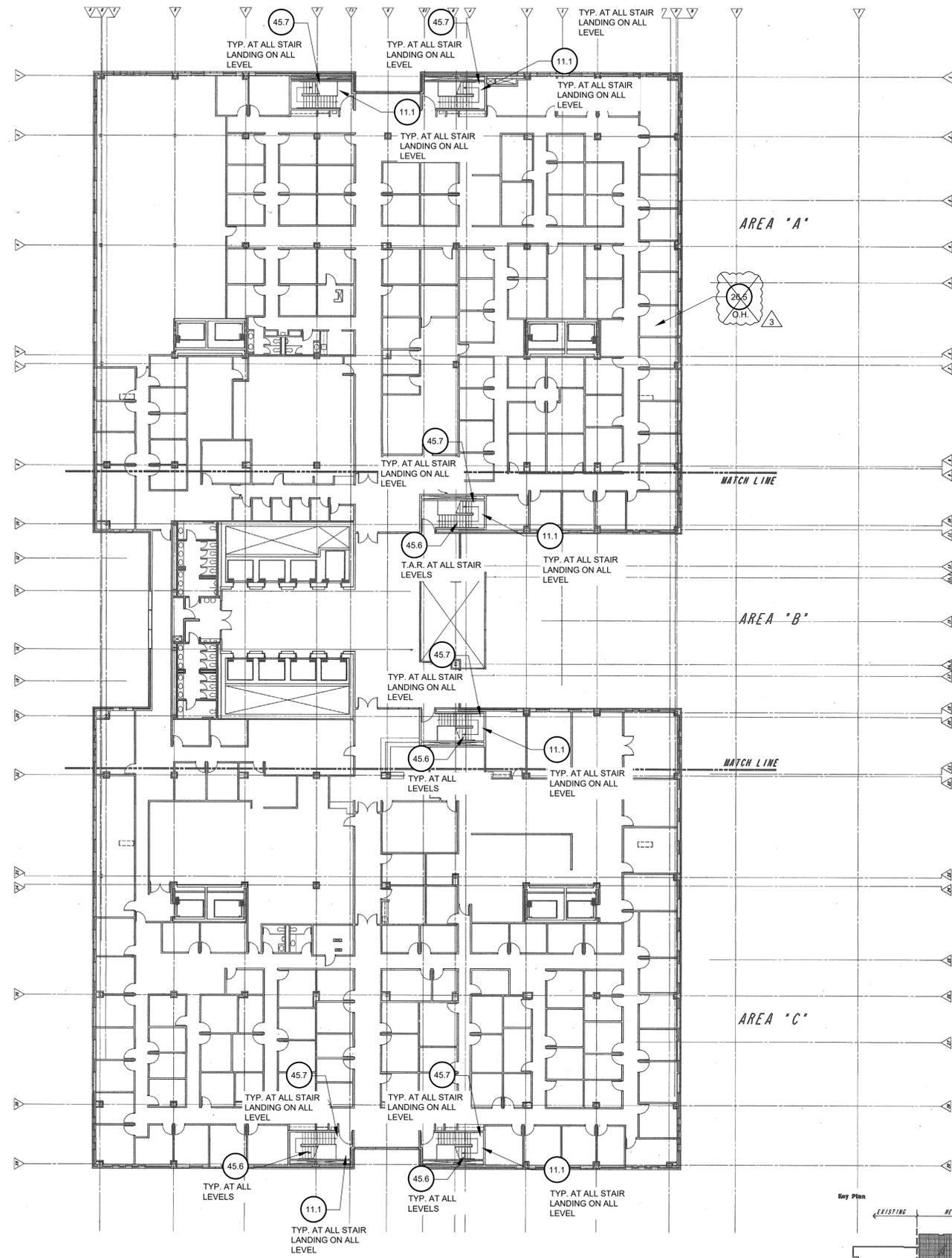
FRANK CROWLEY COURTS
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DALLAS TEXAS

MARK	DATE	DESCRIPTION	ISSUED:
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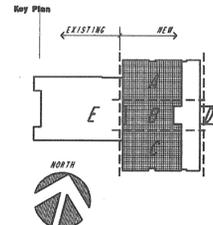
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DRAWN BY: CC
CHECKED BY: AG
SHEET TITLE:
LEVEL NINE -
FLOOR PLAN

R-113

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1 LEVEL TEN FLOOR PLAN



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 ANIRUDH S. GOEL
 145803
 LICENSED PROFESSIONAL ENGINEER
 06/12/2025
Anirudh S. Goel
 Texas Registered Engineering Firm F-004168

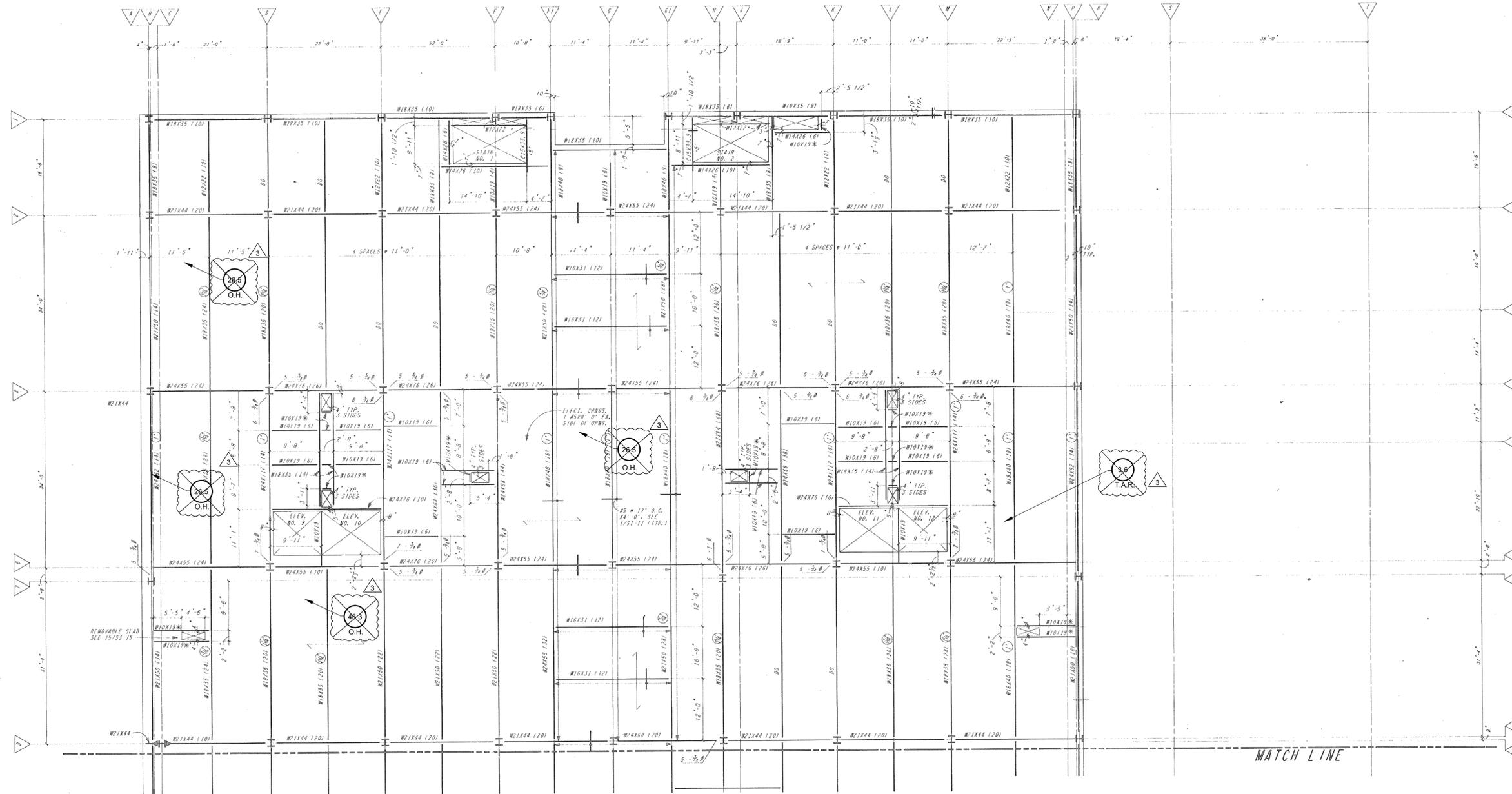
**FRANK CROWLEY COURTS
 BUILDING REPAIRS**
 TEXAS
 DALLAS

MARK	DATE	DESCRIPTION	ISSUED:
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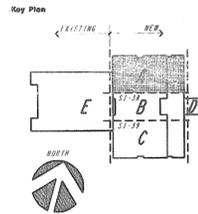
PROJECT NO: 27-001211.01
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 LEVEL TEN -
 FLOOR PLAN

R-114

**FRANK CROWLEY COURTS
 BUILDING REPAIRS**
 TEXAS
 DALLAS

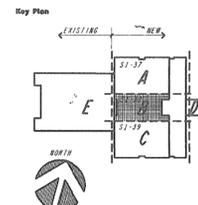
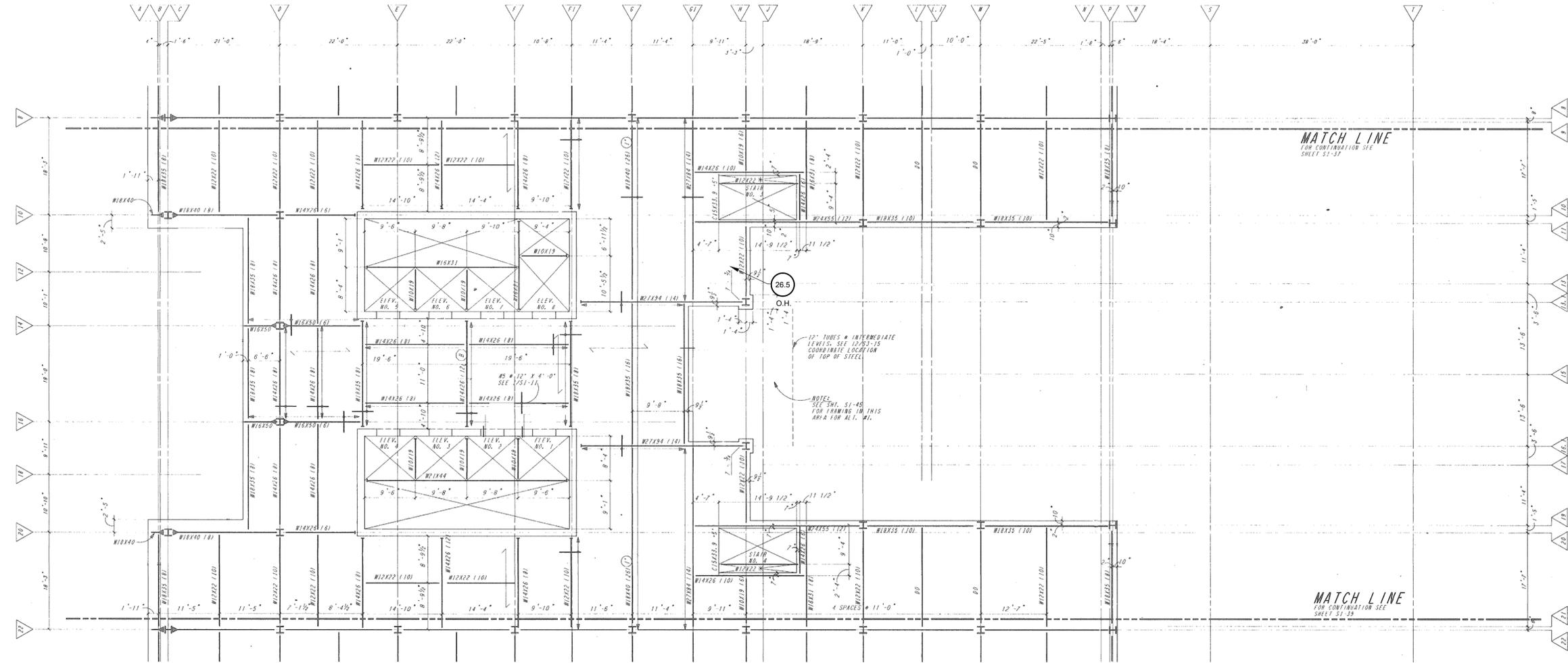


1 LEVEL TEN FRAMING PLAN - AREA A



MARK	DATE	DESCRIPTION	ISSUED:
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2	05/22/2025	ADDENDUM 2	
1	05/05/2025	ADDENDUM 1	
	08/23/2024	ISSUED FOR BIDDING	

PROJECT NO: 27-001211.01
 DRAWN BY: CC
 CHECKED BY: AG
 SHEET TITLE:
 LEVEL TEN -
 FRAMING PLAN -
 AREA A



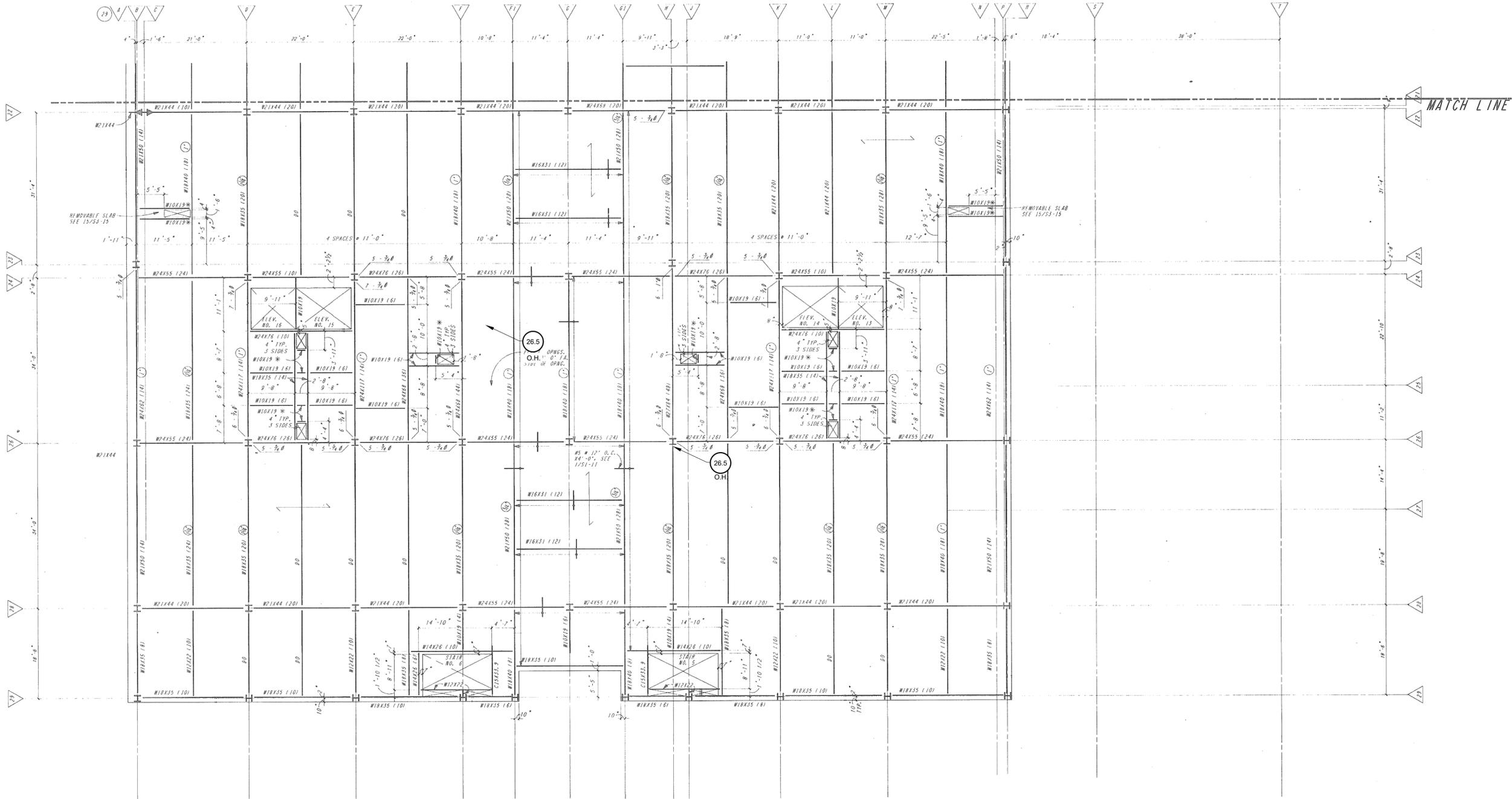
1 LEVEL TEN FRAMING PLAN - AREA B

**FRANK CROWLEY COURTS
 BUILDING REPAIRS**
 TEXAS
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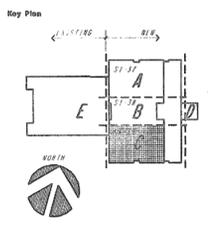
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	08/23/2024	ISSUED FOR BIDDING	

PROJECT NO: 27-001211.01
 DRAWN BY: CC
 CHECKED BY: AG
 SHEET TITLE:
 LEVEL TEN -
 FRAMING PLAN -
 AREA B

**FRANK CROWLEY COURTS
BUILDING REPAIRS**
TEXAS
DALLAS

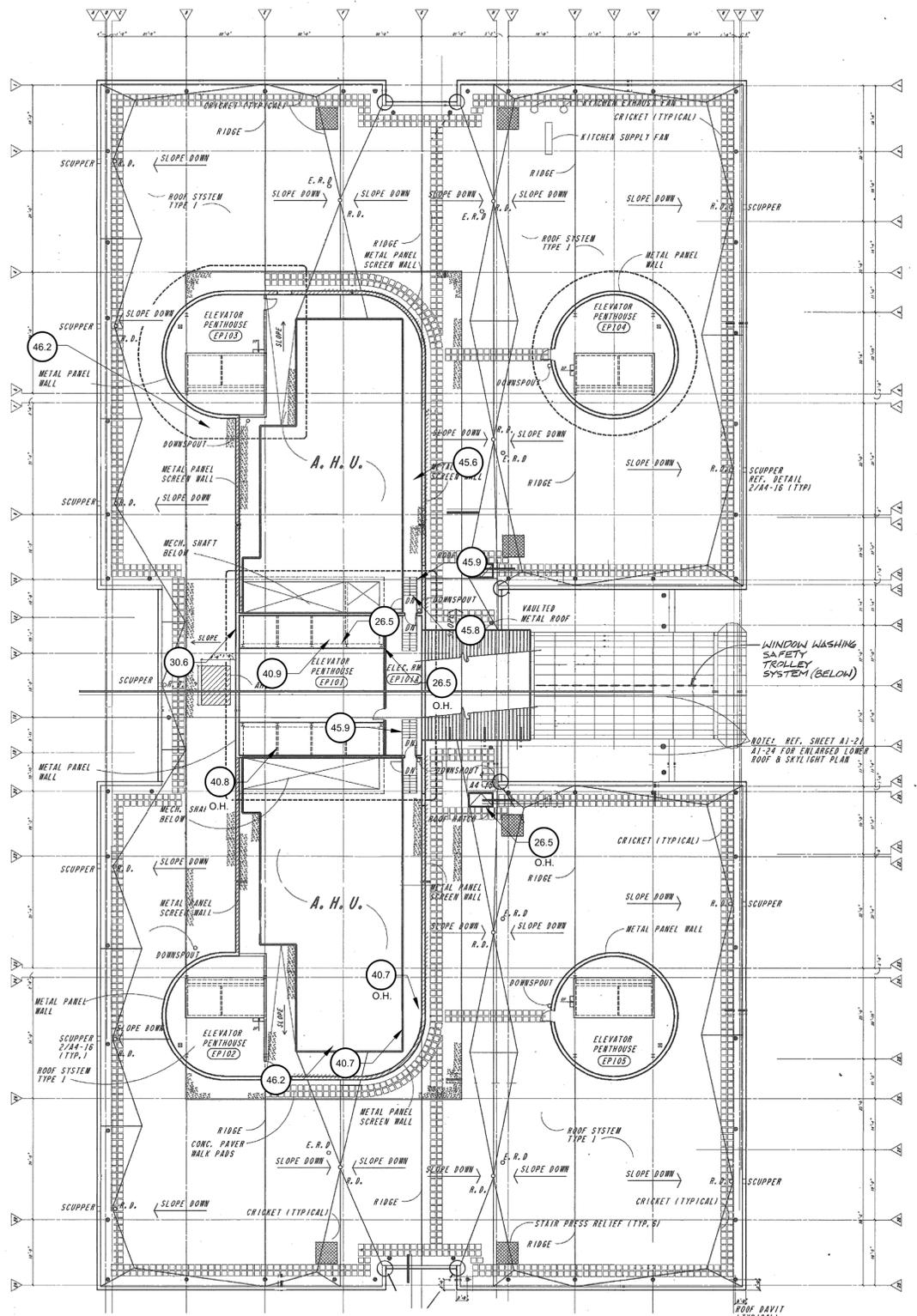
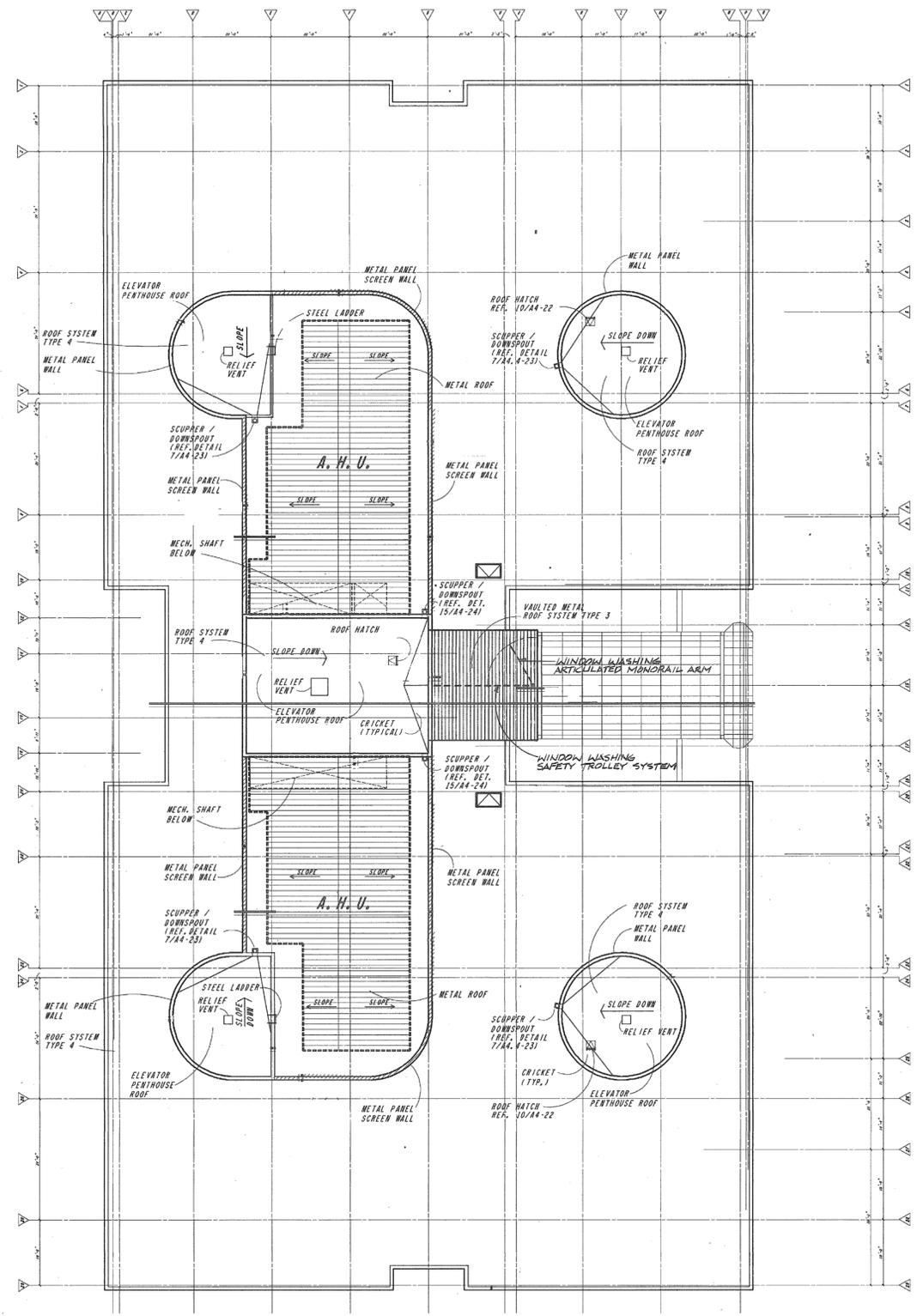


1 LEVEL TEN FRAMING PLAN - AREA C



MARK	DATE	DESCRIPTION	ISSUED
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1	05/05/2025	ADDENDUM 1	
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PROJECT NO: 27-001211.01
DRAWN BY: CC
CHECKED BY: AG
SHEET TITLE:
LEVEL TEN -
FRAMING PLAN -
AREA C



1 ROOF PLAN / PENTHOUSE PLANS

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 145803
 LICENSED PROFESSIONAL ENGINEER
 06/12/2025
Anirudh S. Goel
 Texas Registered Engineering Firm F-004168

**FRANK CROWLEY COURTS
 BUILDING REPAIRS**

TEXAS
 DALLAS

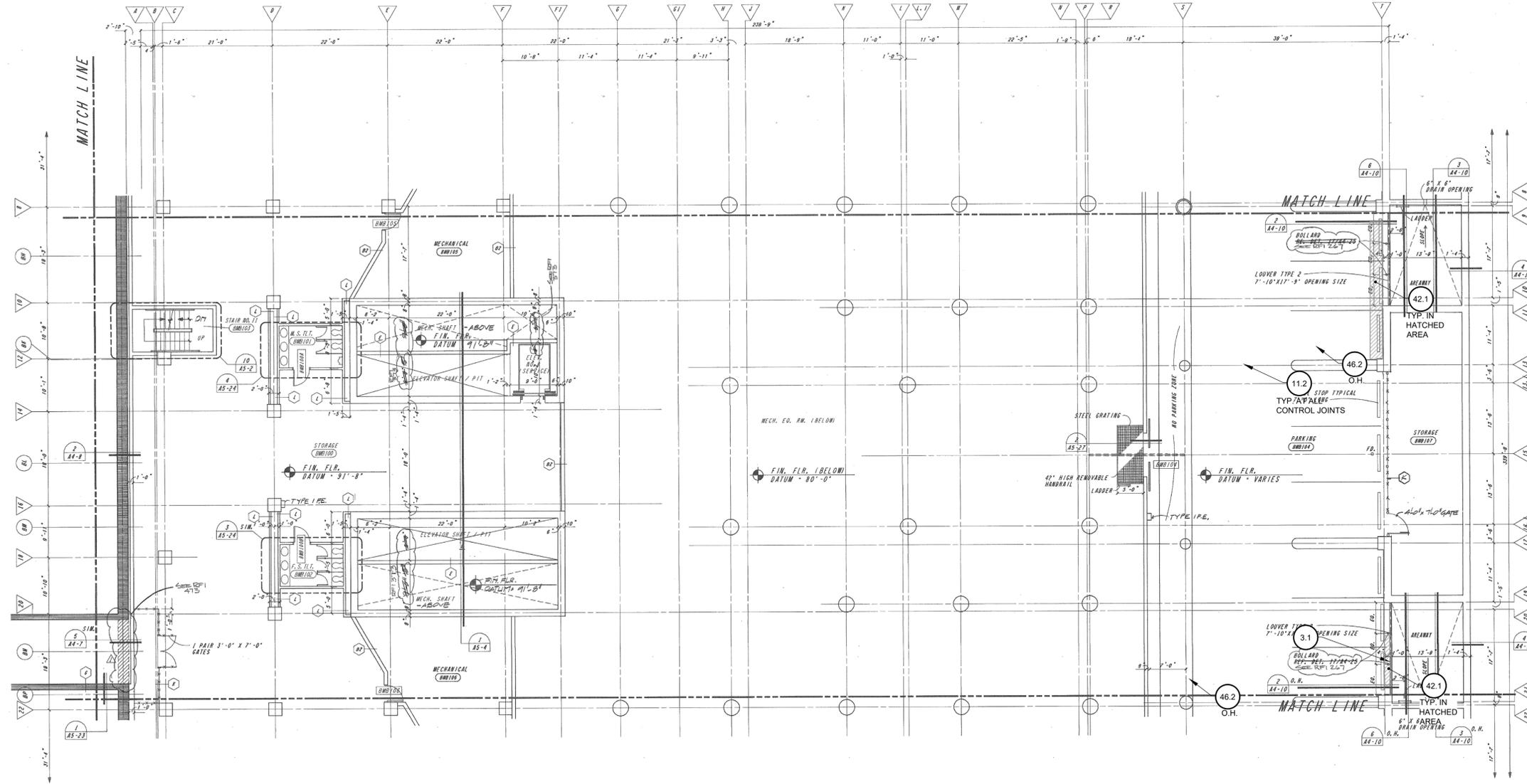
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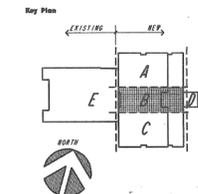
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 PENTHOUSE PLANS

R-118

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1 PARKING LEVEL FLOOR PLAN - AREA B



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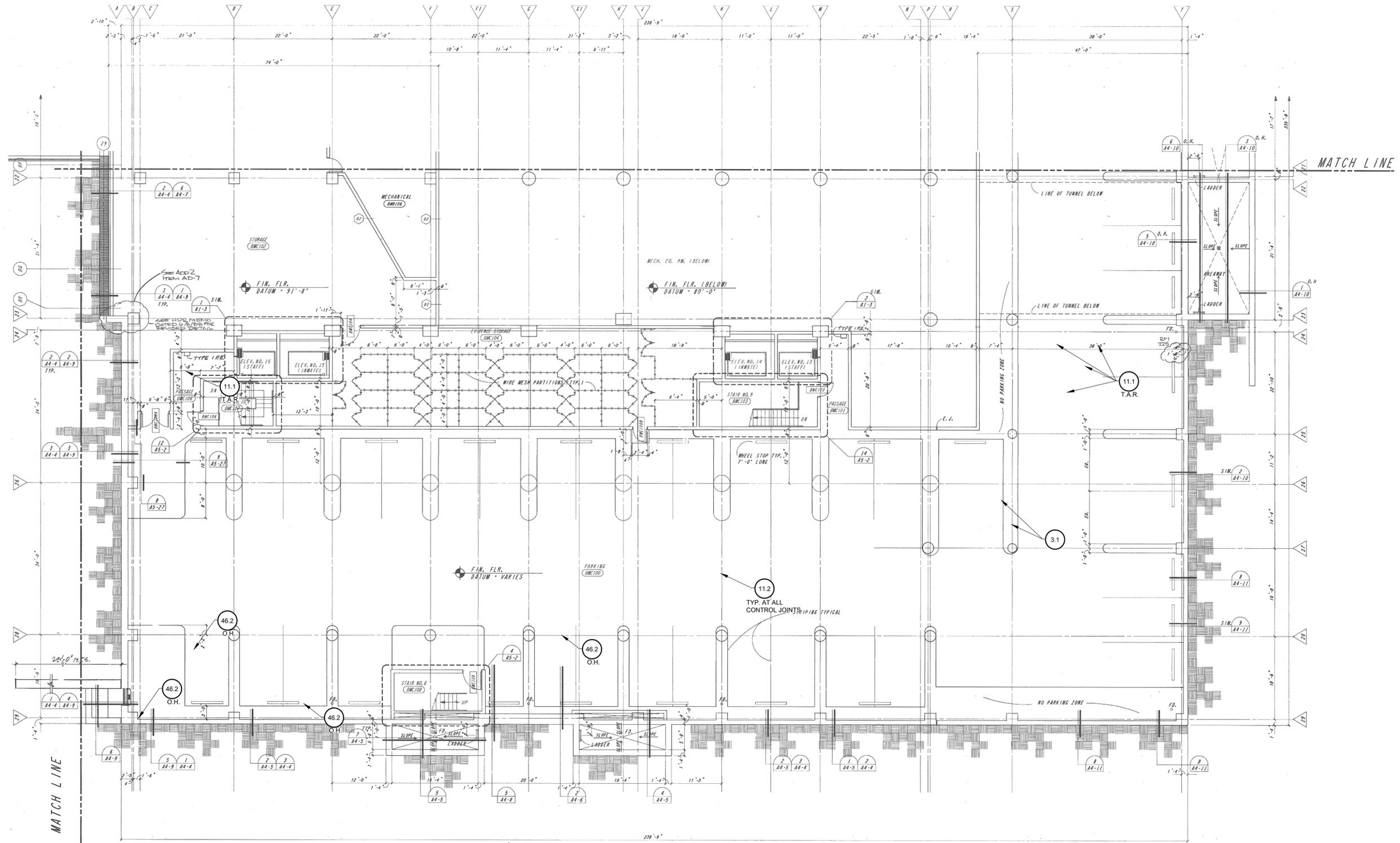
STATE OF TEXAS
 ANIRUDH S. GOEL
 145803
 LICENSED PROFESSIONAL ENGINEER
 06/12/2025
Anirudh S. Goel
 Texas Registered Engineering Firm F-004168

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 BUILDING REPAIRS**
 TEXAS
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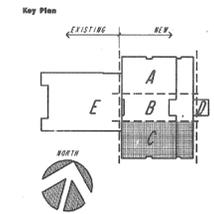
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PROJECT NO: 27-001211.01
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 PARKING LEVEL -
 FLOOR PLAN -
 AREA B

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1 PARKING LEVEL FLOOR PLAN - AREA C



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 Texas Registered Engineering Firm F-004168

**FRANK CROWLEY COURTS
 BUILDING REPAIRS**
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MARK	DATE	DESCRIPTION	ISSUED
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PROJECT NO: 27-001211.01
 DRAWN BY: CC
 CHECKED BY: AG
 SHEET TITLE:
 PARKING LEVEL -
 FLOOR PLAN -
 AREA C

R-121



1 NORTH ELEVATION

SHEET NOTES:

- EXISTING BUILDING INFORMATION IS PROVIDED FOR CONTRACTORS CONVENIENCE ONLY AND MAY NOT ACCURATELY REFLECT THE ACTUAL CONDITIONS IN THE FIELD. WALKER CONSULTANTS (WALKER) MAKES NO GUARANTEE CONCERNING THE ACCURACY OF THE INFORMATION CONTAINED HEREIN. CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS.
- SOME INFORMATION ON THESE DRAWINGS REGARDING EXISTING FEATURES IS NECESSARILY CONJECTURAL DUE TO HIDDEN CONDITIONS AT THE TIME OF PREPARATION. IF CONDITIONS EXIST THAT DIFFER FROM THE DRAWINGS OR ARE NOT ADEQUATELY DETAILED, INFORM WALKER AND ADDITIONAL DETAILS OR INTERPRETATION WILL BE PROVIDED. DO NOT PROCEED WITHOUT VERIFICATION FROM WALKER.
- DIMENSIONS ON THE DRAWINGS MAY BE SHOWN AS APPROXIMATES. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO WORK. FIELD MEASUREMENTS WILL BE REQUIRED TO COMPLETE THE WORK. CONTRACTOR SHALL OBTAIN ALL FIELD MEASUREMENTS AS NECESSARY TO COORDINATE & MATCH NEW CONSTRUCTION TO EXISTING CONDITIONS.



**FRANK CROWLEY COURTS
BUILDING REPAIRS**

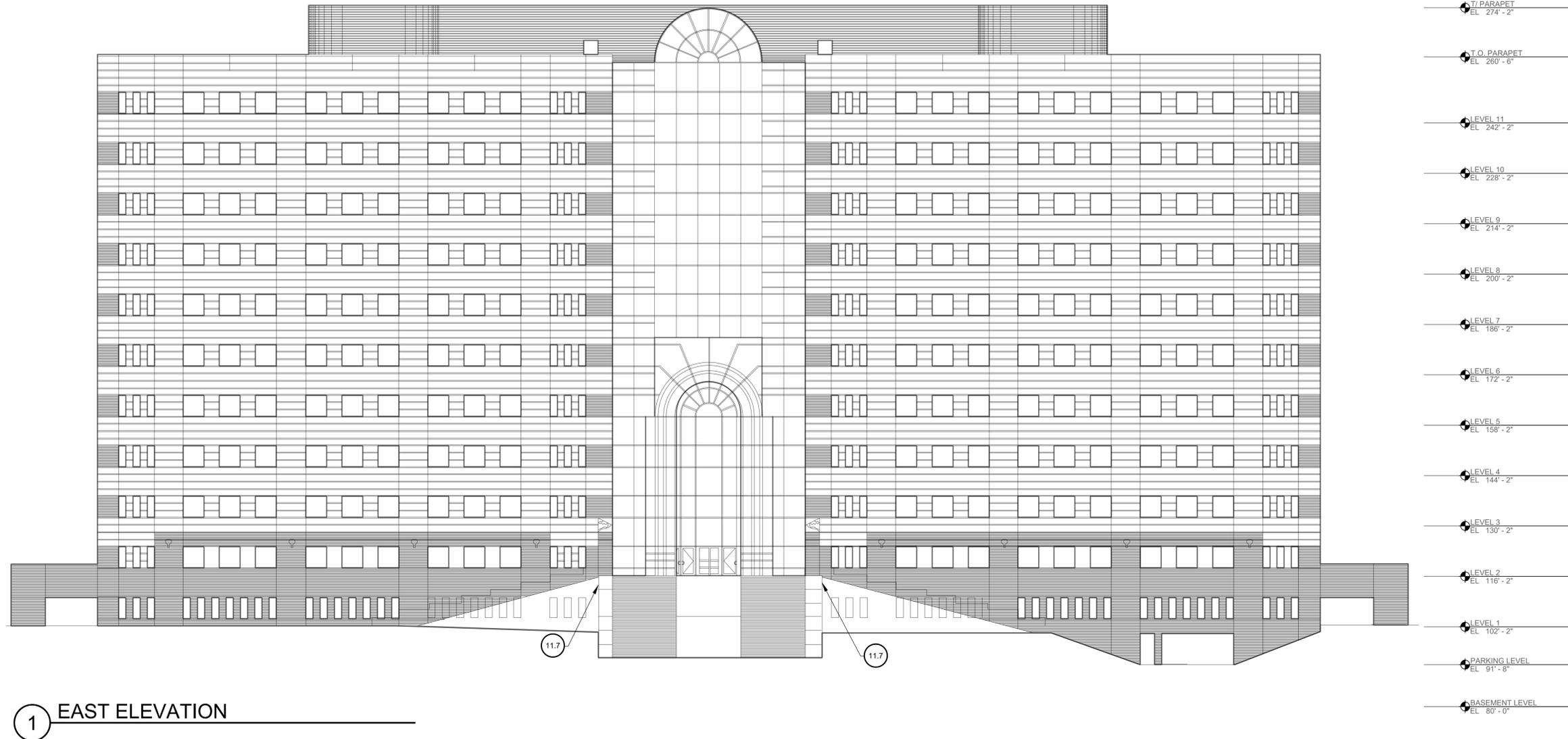
DALLAS TEXAS

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D	08/23/2024	ISSUED FOR BIDDING	

PROJECT NO: 27-001211.01
 DRAWN BY: CC
 CHECKED BY: AG

SHEET TITLE:
 NORTH ELEVATION

R-200



1 EAST ELEVATION

T/ PARAPET	EL. 274' - 2"
T.O. PARAPET	EL. 260' - 6"
LEVEL 11	EL. 242' - 2"
LEVEL 10	EL. 228' - 2"
LEVEL 9	EL. 214' - 2"
LEVEL 8	EL. 200' - 2"
LEVEL 7	EL. 186' - 2"
LEVEL 6	EL. 172' - 2"
LEVEL 5	EL. 158' - 2"
LEVEL 4	EL. 144' - 2"
LEVEL 3	EL. 130' - 2"
LEVEL 2	EL. 116' - 2"
LEVEL 1	EL. 102' - 2"
PARKING LEVEL	EL. 91' - 8"
BASEMENT LEVEL	EL. 80' - 0"

SHEET NOTES:

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**FRANK CROWLEY COURTS
BUILDING REPAIRS**

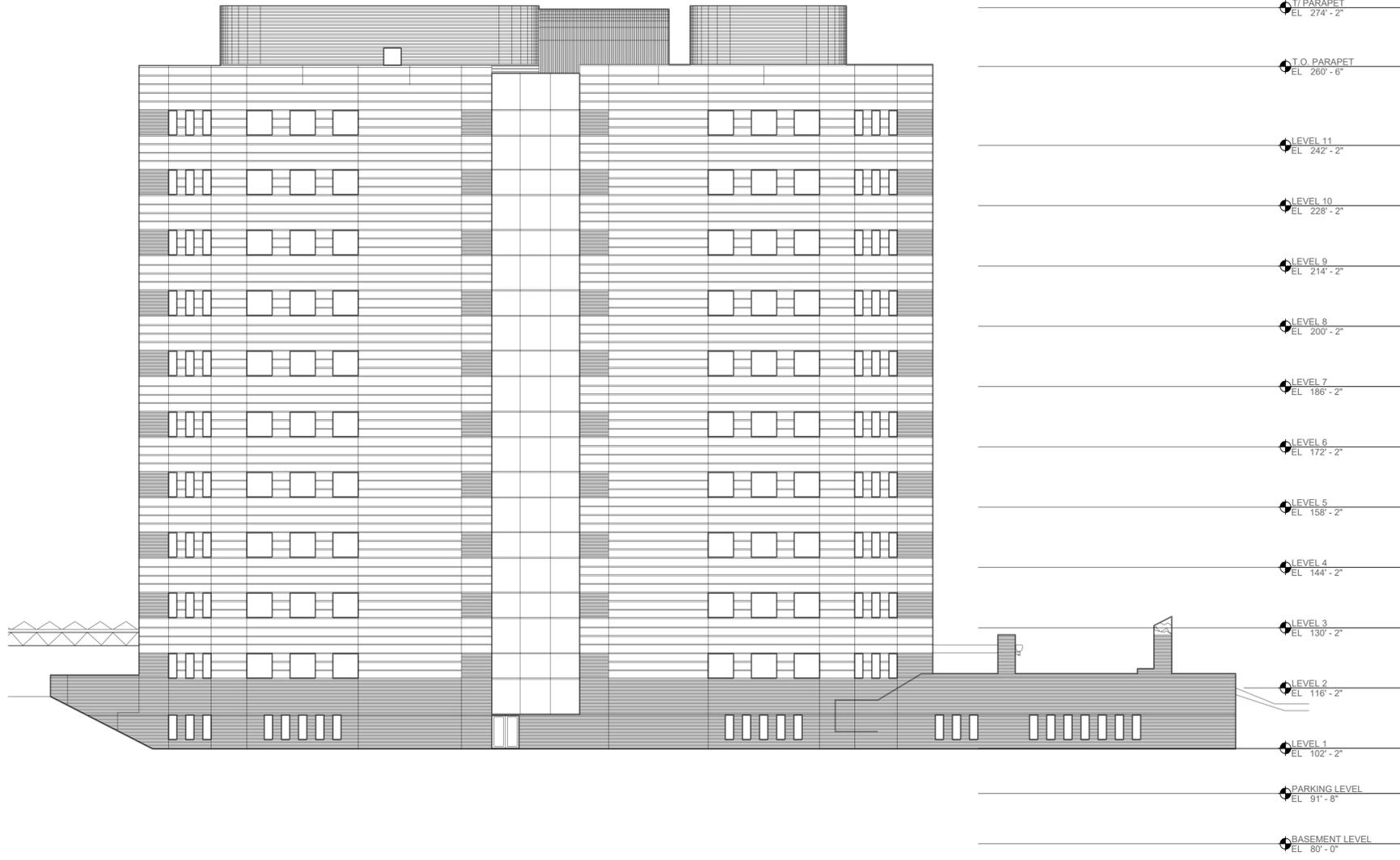
DALLAS TEXAS

MARK	DATE	DESCRIPTION	ISSUED:
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A	08/23/2024	ISSUED FOR BIDDING	

PROJECT NO: 27-001211.01
 DRAWN BY: CC
 CHECKED BY: AG

SHEET TITLE:
 EAST ELEVATION

R-201



1 SOUTH ELEVATION

SHEET NOTES:

- EXISTING BUILDING INFORMATION IS PROVIDED FOR CONTRACTORS CONVENIENCE ONLY AND MAY NOT ACCURATELY REFLECT THE ACTUAL CONDITIONS IN THE FIELD. WALKER CONSULTANTS (WALKER) MAKES NO GUARANTEE CONCERNING THE ACCURACY OF THE INFORMATION CONTAINED HEREIN. CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS.
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BUILDING REPAIRS**

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PROJECT NO: 27-001211.01
 DRAWN BY: CC
 CHECKED BY: AG

SHEET TITLE:
 SOUTH ELEVATION

R-202



1 WEST ELEVATION

SHEET NOTES:

- EXISTING BUILDING INFORMATION IS PROVIDED FOR CONTRACTORS CONVENIENCE ONLY AND MAY NOT ACCURATELY REFLECT THE ACTUAL CONDITIONS IN THE FIELD. WALKER CONSULTANTS (WALKER) MAKES NO GUARANTEE CONCERNING THE ACCURACY OF THE INFORMATION CONTAINED HEREIN. CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS.
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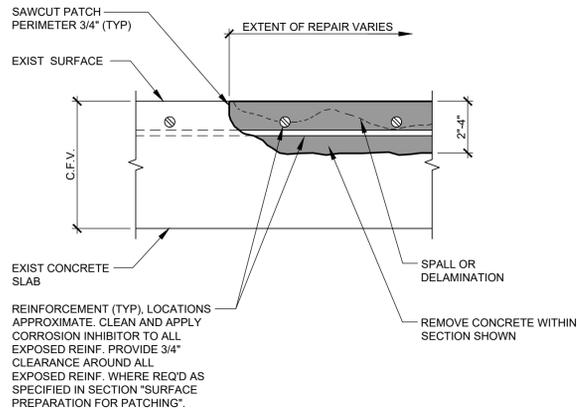


FRANK CROWLEY COURTS
BUILDING REPAIRS
DALLAS TEXAS

MARK	DATE	DESCRIPTION	ISSUED:
A	06/12/2025	ADDENDUM 3	08/23/2024
B	05/22/2025	ADDENDUM 2	
C	05/05/2025	ADDENDUM 1	
D	08/23/2024	ISSUED FOR BIDDING	

PROJECT NO: 27-001211.01
DRAWN BY: CC
CHECKED BY: AG

SHEET TITLE:
WEST ELEVATION

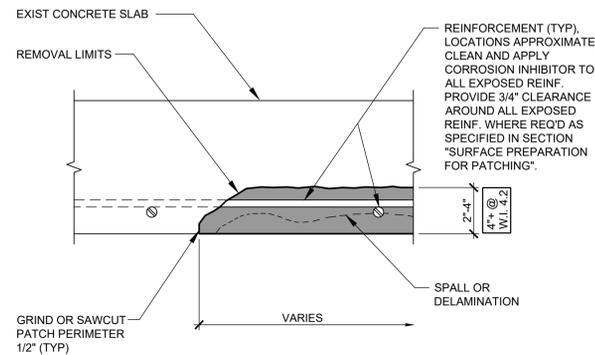


3.1 FLOOR REPAIR - PARTIAL DEPTH

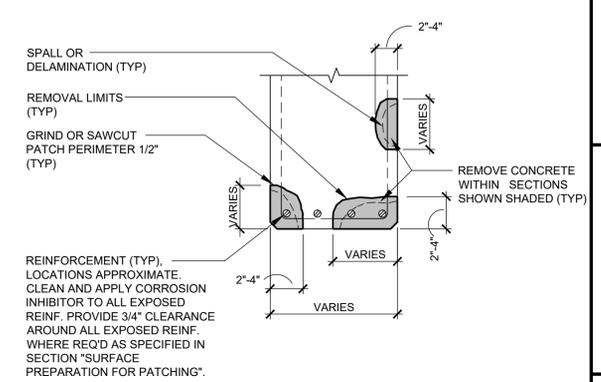
CONTRACTOR TO FILL CRACKS WITH GRAVITY FED EPOXY (SIKADUR-35 HI-MOD LV). PRIOR TO GRAVITY FEEDING CONTRACTOR TO COMPLETELY REMOVE ALL LOAD ON THE FLOOR STRUCTURE STARTING AT THE OUTSIDE EDGE OF THE STORAGE AREA MOVING INWARD.



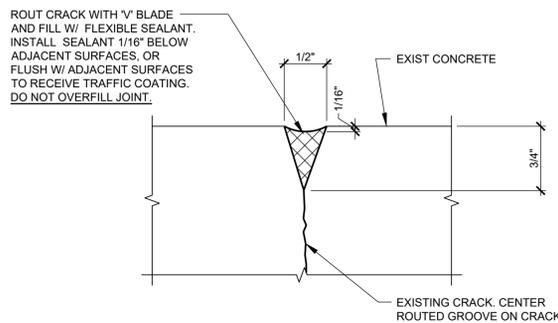
3.6 SLAB REPAIR GRAVITY-FED EPOXY



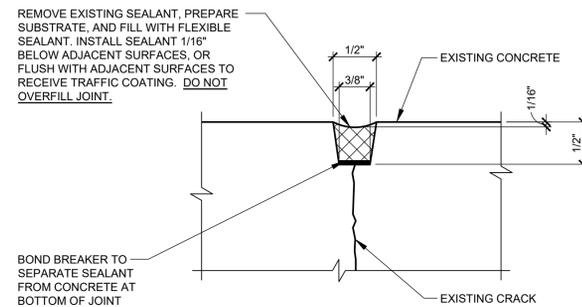
4.1 CEILING REPAIR-PARTIAL DEPTH



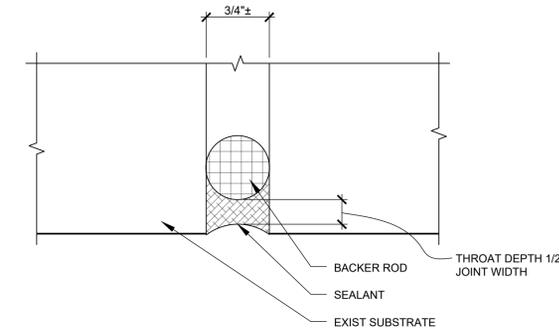
5.1 BEAM REPAIR-PARTIAL DEPTH



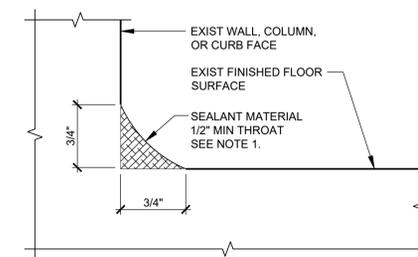
11.1 ROUT & SEAL CRACKS (CRACKS 0.030" OR GREATER)



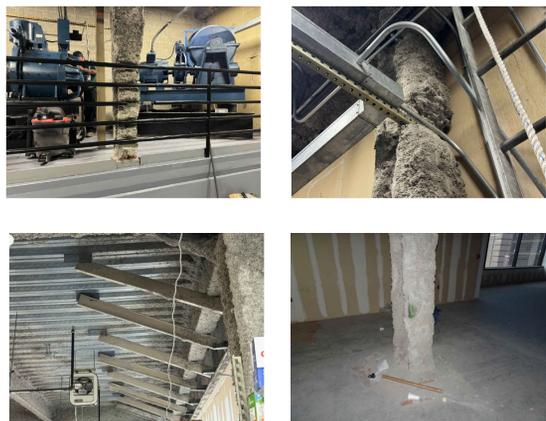
11.2 JOINT SEALANT REPAIR



11.3 VERTICAL JOINT SEALANT



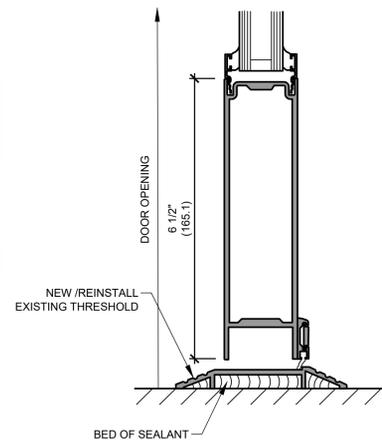
11.7 COVE SEALANT



26.5 REPLACE MISSING FIREPROOFING



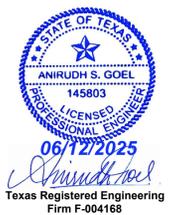
30.6 REPAIR BROKEN LIGHTING PROTECTION CABLE



37.3 DOOR THRESHOLD



40.6 INSTALL MISSING BOLTS AT BASEMENT STAIRCASE



FRANK CROWLEY COURTS
BUILDING REPAIRS
TEXAS
DALLAS

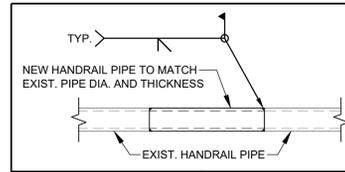
MARK	DATE	DESCRIPTION	ISSUED:
3	06/12/2025	ADDENDUM 3	08/23/2024
2	06/22/2025	ADDENDUM 2	
1	05/05/2025	ADDENDUM 1	
	08/23/2024	ISSUED FOR BIDDING	

PROJECT NO: 27-001211.01
DRAWN BY: CC
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SHEET TITLE:
REPAIR DETAILS

R-500



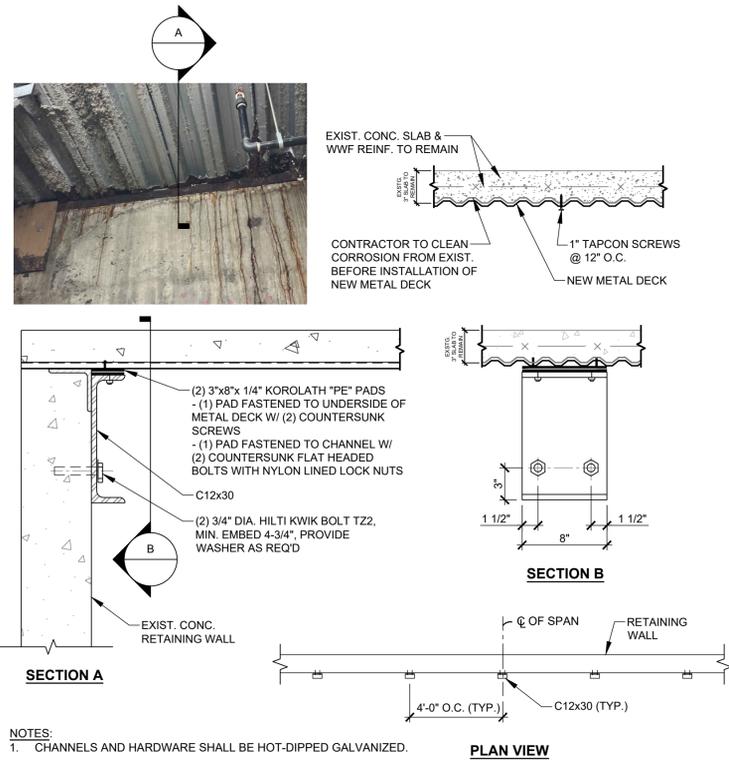
40.7 INSTALL CORROSION RESISTANT FASTENERS AT PREFORMED METAL SLIDING



40.9 REPAIR CUT STEEL HANDRAIL AT ELEVATOR PENTHOUSE



40.8 INSTALL GUARDRAILS AT ROOF CROSSOVER



42.1 CHANNEL SUPPORT AT PLAZA DECK



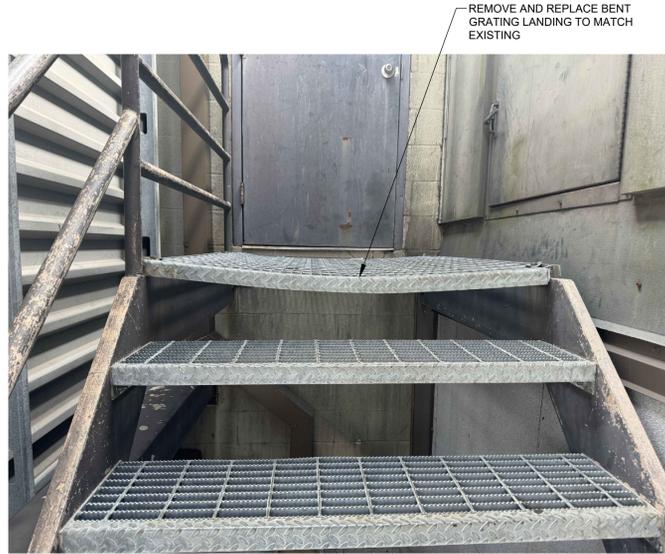
45.6 ABRASIVELY CLEAN AND COAT WITH CORROSION INHIBITING PAINT



45.7 REMOVE PEELING PAINT AND REPAINT UNDERSIDE OF STAIR LANDING

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 SHEET TITLE:
 REPAIR DETAILS



REMOVE AND REPLACE BENT GRATING LANDING AT STAIRCASE TO ELEVATOR PENTHOUSE

45.8



- NOTES:**
- CONTRACTOR TO CUT EXISTING BENT/DAMAGED METAL DECK AND REPLACE IN-KIND.
 - NEW METAL TO OVERLAP EXISTING BY 1'-0" ALONG ALL EDGES.
 - USE 1" TAPCON SCREWS AT 12" O.C. TO ATTACH NEW METAL DECK AS SHOWN IN DETAIL 42.1.

REPAIR AND REPLACE BENT CORRUGATED METAL DECK

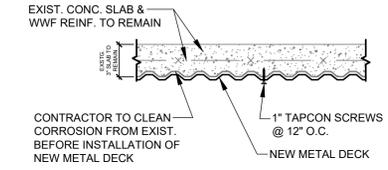
46.1



- NOTES:**
- CONTRACTOR TO CUT EXISTING CORRODED METAL DECK AND REPLACE IN-KIND.
 - NEW METAL TO OVERLAP EXISTING BY 1'-0" ALONG ALL EDGES.
 - USE 1" TAPCON SCREWS AT 12" O.C. TO ATTACH NEW METAL DECK AS SHOWN IN DETAIL 42.1.

REPAIR AND REPLACE CORRODED METAL DECK

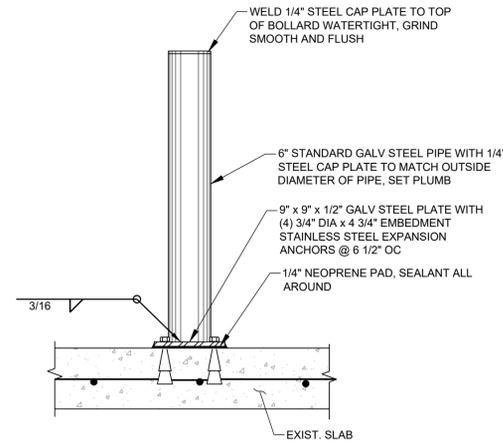
46.2



- NOTES:**
- CLEAN CORRODED STEEL SURFACES AND INFORM ENGINEER IF STEEL HAS LOST MORE THAN 10% OF ITS CROSS SECTIONAL AREA.
 - USE SHERWIN-WILLIAMS MACROPOXY PRIMER AND TOPCOAT FOR CORROSION PROTECTION, OR SUBSTITUTE THAT IS APPROVED EQUAL. INSTALL PER MANUFACTURERS RECOMMENDATIONS.
 - FIREPROOFING TO BE INSTALLED AFTER SANDBLASTING TO BARE MATERIAL AND PAINTING. SEE SPECIFICATION 078100 FOR PRODUCTS TO BE USED FOR FIREPROOFING

STEEL BEAM-CLEANING, COATING AND INSTALLATION OF FIREPROOFING

46.3



- NOTES:**
- THIS DETAIL HAS NOT BEEN DESIGNED FOR VEHICLE BUMPER LOAD SINCE THE APPLICATION IS AT THIS LOCATION AND LIFE SAFETY IS NOT AN ISSUE.
 - FOR REMOVABLE APPLICATION, REPLACE EXP ANCHOR WITH HILTI HDA-P M10 X 100/20 UNDERCUT ANCHORS (OR EQUIV).
 - MAX SERVICE LEVEL CAPACITY IS 1600 LBS.

REMOVE AND REPLACE DAMAGED BOLLARD

46.5

MARK	DATE	DESCRIPTION	ISSUED:
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2	05/22/2025	ADDENDUM 2	
1	05/05/2025	ADDENDUM 1	
	08/23/2024	ISSUED FOR BIDDING	

PROJECT NO: 27-001211.01
DRAWN BY: CC
CHECKED BY: AG
SHEET TITLE:
REPAIR DETAILS