

**City of Fairbanks  
Parking Garage Repairs  
Fairbanks, Alaska**

**Final Construction Documents**

**For:  
City of Fairbanks  
800 Cushman Street  
Fairbanks, AK 99701**

**February 26, 2021**

**Design  
Alaska**



# **City of Fairbanks Parking Garage Repairs Fairbanks, Alaska**

## **Final Construction Documents**

### **Table of Contents**

- **Specifications**
- **Calculations**
- **Drawings**

**By:**

**Design Alaska, Inc.  
601 College Road  
Fairbanks, Alaska 99701**

**February 26, 2021**



DIVISION 01	GENERAL REQUIREMENTS
01 10 00	Summary
01 23 00	Alternates
01 25 00	Substitution Procedures
01 30 00	Administrative Requirements
01 33 00	Submittal Procedures
01 45 00	Quality Control
01 70 00	Contract Closeout
DIVISION 03	CONCRETE
03 93 00	Concrete Rehabilitation
DIVISION 05	METALS
05 50 00	Metal Fabrications
DIVISION 07	THERMAL AND MOISTURE PROTECTION
07 18 16	Vehicular Traffic Coating
07 92 00	Joint Sealants
DIVISION 09	FINISHES
09 96 00	High Performance Coatings

PART 1 GENERAL

1.1 SCOPE: SECTION 01 10 00 - SUMMARY

- A. This section summarizes the work covered by the contract documents including the owner and contractor use of the premises.

1.2 PROJECT INFORMATION

- A. Work of this Contract comprises reonvations to the Fire Training Center, located at 1710 30<sup>th</sup> Avenue, Fairbanks.

- B. Owners name and contact

Timothy Zinza, PE  
City of Fairbanks Engineering Department  
907-459-6745

- C. A/E name and contact

Patrick Brandon, PE, SE  
Design Alaska, Project Manager  
907-452-1241

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Work includes, but is not limited to the following:
1. Safety measures to protect the public from hazards associated with the construction work
  2. Repair of the north spandrel beam connection to column
  3. Install protective waterproofing coat at elevated slab pour strips
  4. Repair cracking in post-tensioned slabs and at slab on-grade control joints
  5. Repair masonry partition cracking
  6. Repaint southeast exterior stairwell

1.4 LOCAL CONDITIONS

- A. Bidders shall familiarize themselves with the Contract Documents and existing conditions, which affect Work, required by the Contract Documents. It will be assumed that bidders have made a personal examination of the jobsite, existing conditions, and documents for prior construction projects associated with this facility made available by the Owner for review by Bidders during the bid period.

- B. Failure to visit the jobsite, to review existing conditions, or to review documents for prior construction projects associated with this facility made available by the Owner for review by Bidders during the bid period will in no way relieve the successful Bidder from the necessity of furnishing any materials or performing any Work that may be required to complete the Work in accordance with the Contract Documents with no additional cost to the Owner.
- C. For building access and for access to the documents for prior construction projects associated with this facility contact:

Timothy Zinza, PE  
City of Fairbanks Engineering Department  
907-459-6745

#### 1.5 PERMITS, FEES, AND INSPECTIONS

- A. Obtain, pay for, and comply with the requirements of all permits, fees, and inspections required by public authorities including plan-check fees associated with the City of Fairbanks permit process.
- B. Transmit copies of permit applications, permits received, and public authority inspection reports to the Owner's project manager within three days of making permit application or receiving permits or reports.

#### 1.6 REFERENCE STANDARDS

- A. For products or workmanship specified by association, trade, or regulatory agency standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Obtain a copy of standards referenced. Maintain a copy at the jobsite during execution of Work to which the standard applies.
- C. The date of the standard is that in effect as of the bid date except when a specific date is specified.

#### 1.7 OWNER OCCUPANCY

- A. The structure will be open to the public for the entire period of construction & will maintain normal operations.

- B. Cooperate with Owner to minimize conflict and to facilitate its operations. In case of conflict accept Contracting Officer's direction as final and adjust use of premises accordingly.

1.8 CONTRACTOR USE OF PREMISES

- A. Limit use of premises for Work and for construction operations, to allow for Owner and Public occupancy.
- B. Limit areas of construction operations to those areas requiring work.
- C. Limit on site storage of materials to Owner project manager indicated staging areas. Contractor is responsible for security of stored materials.
- D. Do not smoke except in specifically designated smoking areas.
- E. Take reasonable and adequate precautions to protect the Owner's property from damage during execution of Work. Restore any damage to Owner property resulting from execution of Work or replace in a manner satisfactory to the Contracting Officer.
- F. Limit construction activities which generate noise levels in excess NC=60 between 7 p.m. and 7 a.m. Monday through Friday and all day Saturday and Sunday.
- G. Provide barriers to protect the public from construction hazards.

1.9 OWNER - FURNISHED PRODUCTS

- A. There are no Owner furnished products.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

PART 1 GENERAL

1.1 SCOPE: SECTION 01 23 00 - ALTERNATES

- A. This section summarizes alternates within the scope of work.

1.2 SCHEDULE OF ALTERNATES

- A. Alternate #1: Recoat the entire southeast stairwell and associated first-floor enclosure and columns, full height.
- B. Alternate #2: Repoint cracked mortar joints at exterior of building at locations indicated on Drawings.

1.3 PROCEDURE FOR ALTERNATES

- A. Alternates will be exercised at the option of Owner. Accepted alternates will be indicated on the Contract and included within the conformed Contract Documents.
- B. Coordinate related work and modify surrounding work affected by accepted alternates as required to complete the Work.
- C. Provide all Work as part of the Base Bid except that Work specifically indicated to be provided as part of an alternate.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

PART 1 GENERAL

1.1 SCOPE: SECTION 01 25 00 - SUBSTITUTION PROCEDURES

- A. This section summarizes procedures to substitute products and procedures during the course of the project.

1.2 SUBSTITUTIONS

- A. Whenever a material, article or piece of equipment is identified in the Contract Documents by reference to manufacturer's or vendor's names, trade names, catalog numbers, etc., it is intended to establish a minimum standard. Unless otherwise noted any material, article or equipment of other manufacturers or vendors which will perform adequately the duties imposed by the general design of the Project will be considered equally acceptable; provided, the material, article or equipment so proposed is, in the opinion of the Contracting Officer, of equal substance, function, dimension, appearance and quality.
- B. Prior to the bid opening, the Bidder shall make their own determination in selecting which specified or substitute equipment to base their proposal upon. Substituted items shall be equal to or better than that specified or indicated in regards to quality, workmanship, finish, space requirements, electrical requirements, performance, or warranties.
- C. After the bid opening, the Contractor shall submit sufficient data in accordance with this Section to establish equality. The Contracting Officer shall be the sole judge of equality and acceptability.
- D. Request for substitution constitutes a representation that the Contractor:
  - 1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.
  - 2. Will provide the same warranty for the substitution as for the specified product.
  - 3. Will coordinate installation and make other changes that may be required for Work to be complete in all respects.
  - 4. Waives claim for additional costs that may subsequently become apparent.
- E. Acceptance of substitute materials will not relieve the Contractor of the responsibility for any changes in their own work or in the work of other crafts caused by the substitution. Any additional costs resulting from substitutions are the responsibility of the Contractor.

- F. Any proposed substitution whose characteristics differ from the specified item to such an extent as to necessitate changes in the mechanical, electrical or other basic design of the Project, shall include the cost of any such changes, the design and the cost of design, which costs shall be borne by the Contractor. Determination of a substitution request will be based on the Contracting Officer's comparisons as to quality, adaptability, aesthetics, Contract amount change, if applicable, etc., between the proposed substitution and specified item.
- G. Substitutions will not be considered when they are indicated or implied on Shop Drawings or Product Data submittals without separate written request, or when acceptance will require substantial revision of Contract Documents.
- H. Only one request for substitution will be considered for each product. When substitution is not accepted, provide specified product.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

PART 1 GENERAL

1.1 SCOPE: SECTION 01 30 00 - ADMINISTRATIVE PROVISIONS

- A. This section covers administration procedures as related to this specific project including meetings, applications for payment and safety.

1.2 PRE-INSTALLATION CONFERENCES

- A. When required by individual specification section, convene pre-installation conference prior to commencing work of that section.
- B. Require attendance of entities directly affecting, or affected by the work.
- C. At the meeting review conditions of installation, preparation and installation procedures, and barriers for maintaining public safety.

1.3 APPLICATIONS FOR PAYMENT

- A. Submit in accordance with contract provisions.
- B. Content and Format as required by Owner.

1.4 SAFETY

- A. Comply with all Federal and State regulations concerning safety of personnel and equipment.

1.5 ONE YEAR CORRECTION PERIOD

- A. If within one year after the date of Final Completion or such longer period of time as may be prescribed by Regulatory Requirements or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work, materials, or products are found to be defective, the Contractor shall promptly, without cost to the Owner and in accordance with the Contracting Officer's written instructions, either correct such defective Work, or, if it has been rejected by the Contracting Officer, remove it from the site and replace it with conforming Work.



- B. If the Contractor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, the Owner may have the defective Work corrected or the rejected Work removed and replaced, and all direct, indirect, and consequential costs of such removal and replacement (including but not limited to fees and charges of engineers, architects, attorneys, and other professionals) will be paid by the Contractor.
  
- C. Provisions of this paragraph are not intended to shorten the statute of limitations for bringing an action.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

PART 1 GENERAL

1.1 SCOPE: SECTION 01 33 00 – SUBMITTAL PROCEDURES

- A. This section covers submittal procedures including submittal register, products and schedule of values.

1.2 PROCEDURES

- A. Deliver submittals to Owner's project manager as directed under Owner's project manager accepted form.
- B. Transmit submittals in accordance with approved Construction Progress Schedule, Submittal Register, and in such sequence to avoid delay in the Work or Work of other Contracts.
- C. Review submittals prior to transmittal; determine and verify field measurements, field construction criteria, manufacturer's catalog numbers, and conformance of submittal with requirements of Contract Documents.
- D. After Owner's project manager review of submittal, revise and resubmit as required, identifying changes made since previous submittal.
- E. Make resubmittals under procedures specified for initial submittals; identify changes made since previous submittal.
- F. Acceptance of schedules, Shop Drawings, Product Data, or samples by the Owner or their representative in no way relieves the Contractor of obligation to perform Work in accordance with requirements of the Contract Documents.

1.3 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

- A. General:
  - 1. Submit electronic (PDF format) of the review submittal or resubmittal for review.
  - 2. Submittals are required for all materials of construction and equipment specified and indicated on the Drawings.
  - 3. Precede each item with a completed Item Data Sheet. See required format attached to the end of this Specification Section.

4. Identify each item with an item number matching the item number for that item listed in the Submittal Schedule and Shop Drawing Record. Separate each item by divider sheets with plastic index tabs between each item. Type item numbers on both sides of paper inserts.
  5. Each submittal or resubmittal shall be complete and shall contain all previously submitted material except that being replaced by new or revised material, which shall be removed. Partial or improperly indexed or tabbed submittals or resubmittals shall be rejected without review or comment.
  6. Do not submit "updates" for previous submittal packages with resubmittals. Previous submittals will not be updated.
- B. Shop Drawings:
1. Present in a clear and thorough manner. Label each Drawing with Owner Project name and Project number. Identify each element of Drawings by reference to sheet number and detail, schedule, or room number of Contract Documents.
  2. Identify field dimensions; show relation to adjacent or critical features or Work or products.
  3. Minimum Sheet Size: 11 inches by 17 inches.
- C. Product Data:
1. Submit only pages that are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.
  2. Modify manufacturer's standard schematic Drawings and diagrams to supplement standard information and to provide information specifically applicable to the Work. Delete information not applicable.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

ATTACHMENT: ITEM DATA SHEET  
SUBMITTAL REGISTER

ITEM DATA SHEET

1. Item Name/Drawing Equipment Number:
  
2. Specification Section/Drawing Number:
  
3. Manufacturer/Model Number:
  
4. Size/Capacity:
  
5. Use And Location: (a)
  
6. Spare Parts Source:
  
7. Providers Of Warranty Service:
  
8. Proposed Deviations From The Contract Documents: (b)
  
9. Other Contractor Comments:
  - (a) For most sections of the specifications this information need only be provided when the product's use and location is not obvious.
  - (b) If this section is left blank it will be assumed that proposed equipment is exactly as specified and indicated on the drawings.

Printed on:  
2/25/2021

Project: Parking Garage Beam Repair  
Project No: 202001

Owner: City of Fairbanks  
Contractor:  
Consultant: Design Alaska, Inc.

SD-01 Preconstruction; SD-02 Shop Drawings; SD-03 Product Data; SD-04 Samples; SD-05 Design Data; SD-06 Test Report; SD-07 Certificates; SD-08 Manufacturer's Instructions; SD-09 Manufacturer's Report; SD-10 O&M Data; SD-11 Closeout; SD-12 LEED

Item No.	Transmittal No.	Spec. Section or Drawing No.	Submittal Description	Spec. Paragraph or Drawing Detail No.	Item Description	Contractor's Scheduled Submittal Date	Actual		Status	Review Comments
							Submittal Date	Return Date		
1=No Exception Taken; 2 = Accepted as Noted; 3 = Revise & Resubmit; 4 = Submit Specified Item; 5 = Rejected										
<b>01 45 00</b>					<b>Quality Control</b>					
1		1.2.A	SD-01		Special Inspector Qualifications					
<b>03 93 00</b>					<b>Concrete Rehabilitation</b>					
1		1.2.A	SD-03	2.1.A	Epoxy Crack Injection Adhesive					
2		1.2.A	SD-03	2.1.B	Capping Adhesive					
3		1.2.A	SD-03	2.2.A	Horizontal Concrete Repair Mortar					
4		1.2.A	SD-03	2.2.B	Overhead Concrete Repair Mortar					
5		1.2.A	SD-03	2.3.A	Bonding Primer and Reinforcement Corrosion Inhibitor					
6		1.2.B	SD-07		Installer Qualifications					
7		1.2.B	SD-07		Testing Agency Qualifications					
8		1.2.C	SD-07		Material Certificates					
<b>05 50 00</b>					<b>Metal Fabrications</b>					
1		1.2.a	SD-02		Shop Drawings					
2		1.2.B.1	SD-07		Qualification Data for Installer					
3		1.2.B.2	SD-07		Qualification Data for Fabricator					
4		1.2.B.3	SD-07		Qualification Data for Testing Agency					
5		1.2.C	SD-07		Welding Certificates					
<b>07 18 16</b>					<b>Vehicular Traffic Coating</b>					
1		1.3.A	SD-03	2.2.A	Vehicular Traffic Coating					
2		1.3.A	SD-03	2.2.C	Aggregate					
3		1.3.B	SD-07		Installer Qualifications					
<b>07 92 00</b>					<b>Joint Sealants</b>					
1		1.2.A	SD-03	2.2.A	Type S - Polyurethane Self-Leveling Sealant					
2		1.2.A	SD-03	2.3.A	Type S - Polyurethane Non-sag Sealant					
<b>09 96 00</b>					<b>High-Performance Coatings</b>					
1		1.3.A	SD-03	2.2.B	Top Coat : Existing Galvanized Stair					
2		1.3.A	SD-03	2.2.C	Top Coat : Existing Painted Stair and New Fabrication					
3		1.3.A	SD-03	2.3.A	Primer					
4		1.3.A	SD-03	2.4	Cleaner and Etcher					
5		1.3.B	SD-02		Samples					
6		1.3.C	SD-08		Manufacturer's Installation Instructions					
7		1.3.D	SD-11		Maintenance Materials					
8		1.4.A	SD-06		Dry Mill Test Reports					
9		1.4.B	SD-07		Testing Agency Certification					
10		1.4.C	SD-10		Maintenance Data					

Corrections or comments do not relieve Contractor from compliance with Contract Documents. Submittals are reviewed only for general conformance with the design concept of the project and general compliance with the Contract Documents. The Contractor is responsible for confirming compliance with the Contract Documents, confirming & correlating all quantities & dimensions, selecting fabrication processes, techniques of construction, coordinating his work with that of other trades, and existing conditions; and performing his work in a safe and satisfactory manner.

Reviewed By \_\_\_\_\_

Date \_\_\_\_\_

PART 1 GENERAL

1.1 SCOPE: SECTION 01 45 00 - QUALITY CONTROL

- A. This section covers quality control procedures.

1.2 SUBMITTALS

- A. Special Inspector Qualifications.

1.3 WORKMANSHIP

- A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- B. Perform Work by persons qualified to produce workmanship of specified quality.

1.4 MANUFACTURERS' INSTRUCTIONS

- A. Comply with instructions in full detail, including each step in sequence. Provide accessories recommended by manufacturer for service intended and accessories indicated. Should instructions conflict with Contract Documents, request clarification from Owner's project manager before proceeding.

1.5 CODES, ORDINANCES, AND STANDARDS

- A. Federal, State and Local Codes and Ordinances take precedence over these Specifications and Drawings where conflicts occur unless the Drawings or Specifications call for more stringent requirements. Notify the Owner's project manager in writing of conflicts.
- B. Comply with all applicable laws, building and construction codes, OSHA Safety and Health Regulations and applicable requirements of any governmental agency under whose jurisdiction this Work is being performed.

1.6 AUTHORITY HAVING JURISDICTION PERMITS AND INSPECTIONS

- A. The Authority Having Jurisdiction (AHJ) and public authorities for this project is as follows:
  - 1. City of Fairbanks  
Building Department, City Hall  
800 Cushman Street  
Fairbanks, AK 99701  
(907) 459-6270
- B. Apply for and obtain a plan review and permits for the project in accordance with AHJ policies and procedures. Pay any applicable fees for the permits. Submit copies of applications, permits and any correspondence with the AHJ to the owner for information.
- C. Obtain all required inspections by the AHJ. Schedule all inspection with AHJ and provide information to the owner. Inform owner immediately if inspection is rescheduled. Provide copied of all inspection reports and follow-up items. Provide support and assistance for all AHJ inspections.

1.7 SPECIAL INSPECTIONS

- A. Contractor shall hire third-party Special Inspector for all code-required special inspections. Required Special Inspections are listed on the project Drawings.
- B. Leave copies of Special Inspection reports with the Contractor on site before leaving the site.

1.8 OWNER INSPECTION

- A. The Owner will periodically inspect the Work. Provide assistance to inspection personnel required for complete and thorough inspections. Owner will inspect the Work at will.
- B. Inspection of Work or the witnessing of testing of Work by the Owner or their representative in no way relieves the Contractor of obligation to perform Work in accordance with requirements of the Contract Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

PART 1 GENERAL

1.1 SCOPE: SECTION 01 70 00 - CLOSEOUT REQUIREMENTS

- A. This section covers contract closeout requirements and warranties.

1.2 CLOSEOUT PROCEDURES

- A. When Contractor considers Work to be substantially complete, submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Owner inspection.
  - 1. When the Owner, on basis of said inspection, determines that the Work is substantially complete, the Contractor will be so notified and a list of deficiencies, to be corrected or completed by the Contractor, will be attached to said notice. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

1.3 WARRANTIES

- A. All manufacturer and supplier standard equipment, item or accessory warranties shall be the Contractor's responsibility under Project warranty period.
- B. All warranties longer than the Project warranty period shall be assigned to the Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION



PART 1 GENERAL

1.1 SCOPE: SECTION 03 93 00 – CONCRETE REHABILITATION

- A. This Section includes the following:
  - 1. Epoxy crack injection.
  - 2. Horizontal concrete spall repair.
  - 3. Overhead concrete spall repair.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include material descriptions, chemical composition, physical properties, material safety data sheets, test data, and mixing, preparation, and application instructions.
- B. Qualification Data: For installers and testing agency.
  - 1. For products required to be installed by workers approved by product manufacturers, include letters of acceptance by product manufacturers certifying that installers are approved to apply their products.
- C. Material Certificates: For each type of product indicated, signed by manufacturers.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Installer that employs workers trained and approved by manufacturer to apply concrete patching and rebuilding materials, epoxy crack injection materials, polymer overlays, polymer sealers, trowel grade epoxy mastic.
- B. Manufacturer Qualifications: Manufacturer that employs factory-trained representatives who are available for consultation and Project-site inspection at contractor's expense.
- C. Source Limitations: Obtain concrete patching and rebuilding materials and epoxy crack injection materials through one source from a single manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original and unopened containers, labeled with type and name of products and manufacturers.

- B. Comply with manufacturer's written instructions for minimum and maximum temperature requirements and other conditions for storage.
- C. Store aggregates, covered and in a dry location, where grading and other required characteristics can be maintained and contamination avoided.

## 1.5 PROJECT CONDITIONS

- A. Environmental Limitations for Epoxies: Do not apply when air and substrate temperatures are outside limits permitted by manufacturer. During hot weather, cool epoxy components before mixing, store mixed products in shade, and cool unused mixed products to retard setting. Do not apply to wet substrates unless approved by manufacturer.

## PART 2 PRODUCTS

### 2.1 CRACK REPAIR EPOXIES

- A. Epoxy Crack Injection Adhesive: ASTM C 881/C 881M, Type IV, Grade 1, solvent free.
  - 1. Basis of Design: Sika Corporation; Sikadur 35, Hi-Mod LV; Sikadur 35, Hi-Mod LV LPL.
- B. Capping Adhesive: Product manufactured for use with crack injection adhesive by same manufacturer.
  - 1. Basis of Design: Sika Corporation; Sikadur-31, Hi-Mod Gel.

### 2.2 CONCRETE REPAIR MORTAR

- A. Horizontal Concrete Repair Mortar: Two-component, polymer-modified, cementitious mortar and corrosion inhibitor.
  - 1. Basis of Design: Sika Corporation; Sikatop-122. Areas where the depth of the repair is less than 1-inch shall be repaired with polymer-modified portland cement mortar. In areas where the depth of the repair is greater than 1 inch, the repair shall be made with polymer-modified portland cement concrete in accordance with the technical data sheet.
- B. Overhead Concrete Repair Mortar: Two-component, polymer-modified, non-sag cementitious mortar and corrosion inhibitor.
  - 1. Sika Corporation; Sikatop-122 Plus.

### 2.3 PRIMER

- A. Bonding Primer and Reinforcement Corrosion Inhibitor: product used to bond fresh concrete to existing hardened concrete and protect exposed reinforcing.
  - 1. Basis of Design: Sika Corporation; Sika Armatec-110 EpoCem.

### 2.4 MIXES

- A. Mix products in clean containers, according to manufacturer's written instructions.
  - 1. Add clean silica sand and coarse aggregates to products only as recommended by manufacturer.
  - 2. Do not add water, thinners, or additives unless recommended by manufacturer.
  - 3. When practical, use manufacturer's premeasured packages to ensure that materials are mixed in proper proportions. When premeasured packages are not used, measure ingredients using graduated measuring containers; do not estimate quantities or use shovel or trowel as unit of measure.
  - 4. Do not mix more materials than can be used within recommended open time. Discard materials that have begun to set.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Locate areas for rehabilitation, per Drawings.
- B. Notify the Project Manager of delineation and quantities for approval before proceeding with rehabilitation.

### 3.2 PREPARATION

- A. Protect people, motor vehicles, equipment, surrounding construction, Project site, plants, and surrounding buildings from injury resulting from concrete rehabilitation work.
  - 1. Neutralize and collect alkaline and acid wastes according to requirements of authorities having jurisdiction, and dispose of by legal means off Government's property.

2. Dispose of runoff from wet operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
  3. Collect runoff from wet operations and dispose of by legal means off Government's property.
- B. Reinforcing Bar Preparation: Remove loose and flaking rust from reinforcing bars by hand methods until only tightly bonded light rust remains.
- C. Surface Preparation for Concrete Patching (Horizontal and Overhead):
1. Remove delaminated material and deteriorated concrete surface material. Roughen surface of concrete by bushing, sand blasting, shot blasting, or scarifying needle scaling. Sweep and vacuum roughened surface to remove debris followed by low-pressure water cleaning. Allow wall surface to completely dry. Walls must be roughened with fractured surface with a profile of at least 1/16-inch.

### 3.3 APPLICATION

- A. General: Comply with manufacturer's written instructions and recommendations for application of products, including surface preparation..
- B. Structural Epoxy Injection: Comply with manufacturer's written instructions and the following:
1. Clean areas to receive capping adhesive of oil, dirt, and other substances that would interfere with bond, and clean cracks with oil-free compressed air or low-pressure water to remove loose particles.
  2. Place injection ports as recommended by epoxy manufacturer, spacing no farther apart than thickness of member being injected or at a spacing recommended by the manufacturer. Seal injection ports in place with capping adhesive.
  3. Seal cracks at exposed surfaces with a ribbon of capping adhesive at least 1/4-inch thick by 1-inch wider than crack.
  4. Inject cracks wider than 1/16-inch to a depth to match slab thickness.
  5. Inject epoxy adhesive, beginning at widest part of crack and working toward narrower parts. Inject adhesive into ports to refusal, capping adjacent ports when they extrude epoxy. Cap injected ports and inject through adjacent ports until crack is filled.
  6. After epoxy adhesive has set, remove injection ports and grind surfaces smooth.

- C. Concrete Repair Mortar (Horizontal and Overhead): Comply with manufacturer's written instructions and the following:
1. Pre-soak the substrate to be saturated surface dry (SSD) with no standing water.
  2. Scrub the mortar into the substrate, filling all pores and voids. While the scrub coat is still plastic, force material against edge of repair, working toward center. If repair area is too large to fill while scrub coat is still wet use pre-approved bonding primer in lieu of scrub coat.
  3. Where repair is intersected by control joint, maintain or re-route/cut joint through the patch and seal per 07 92 00.
  4. Consolidate, then screed. Allow mortar or concrete to set to desired stiffness, then finish with trowel, manual or power, for smooth surface. Broom or burlap drag for rough surface. Match existing slab finish.
  5. Cure with either a spray-applied film-forming curing compound or wet burlap and polyethylene, a fine mist of water or a water-based compatible curing compound. Pretesting of curing compound recommended. Moist curing should commence immediately after finishing and continue for 48 hours. Protect newly applied material from rain, sun, and wind until compressive strength is 70% of the 28-day compressive strength. To prevent from freezing cover with insulating material.

END OF SECTION

PART 1 GENERAL

1.1 SCOPE: SECTION 05 50 00 - METAL FABRICATIONS

A. Section Includes:

1. General metal fabrications

1.2 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

B. Qualification Data:

1. For qualified installer.
2. For qualified fabricator.
3. For qualified testing agency.

C. Welding certificates.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fabricator Qualifications: Engage a firm experienced in fabricating work similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work.

C. Welder Qualifications: Qualify procedures and personnel according to the following, as applicable:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Inspector Qualifications: Tests and Inspections shall be performed by an AWS Certified Weld Inspector (CWI) with the proper AWS certifications to be able to conduct such tests and inspections.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of beams, columns, and other construction contiguous with metal fabrications by field measurements before fabrication.

1.5 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

PART 2 PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

- A. Steel Plates, Shapes, Bars, and Channels: ASTM A 36.

2.3 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with specified finishes.
- C. Finish Coat per Specification 09 96 00

2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32-inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

## 2.5 FABRICATION QUALITY CONTROL

- A. Testing Agency: Engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports. Minimum testing agency qualifications per Part 1 of this specification.
  - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.



2. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.
  - a. All shop welds are to be visually inspected.
3. Inspections listed above are not required where the work is done on the premises of a fabricator registered and approved to perform such work without special inspection, AWS Certified Fabricator or approved equivalent.

## 2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

## 2.7 STEEL FINISHES - GENERAL

- A. Preparation for finish coating: Prepare surfaces to comply with requirements indicated in Specification 09 96 00.

# PART 3 EXECUTION

## 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

- C. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, and other connectors.

### 3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections. Minimum testing agency qualifications per Part 1 of this specification.
- B. Welded Connections:
  - 1. All field welds will be visually inspected according to AWS D1.1/D1.1M.
    - a. In addition to visual inspection, field welds may be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
      - 1) Liquid Penetrant Inspection: ASTM E 165.
      - 2) Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
      - 3) Ultrasonic Inspection: ASTM E 164.
      - 4) Radiographic Inspection: ASTM E 94.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0 mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint.

END OF SECTION

PART 1 GENERAL

1.1 SCOPE: SECTION 07 18 16 – VEHICULAR TRAFFIC COATINGS

- A. Polyurethane traffic coating system as specified and as indicated on the Drawings.

1.2 PERFORMANCE REQUIREMENTS

- A. Cold fluid applied polyurethane traffic waterproofing system is intended to perform as a continuous barrier against liquid water and to flash or discharge to the incidental water. Membrane system shall accommodate movements of building materials as required with accessory sealant materials at such locations, changes in substrate, perimeter conditions and penetrations.
- B. Installed waterproofing membrane/surfacing system shall not permit the passage of water and will withstand the anticipated traffic wear exposures in accordance with the most current revision of ASTM C957, "High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with Integral Wearing Surface."

1.3 SUBMITTALS

- A. Product Data:
  - 1. Materials list of items proposed to be provided under this Section.
  - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - 3. Manufacturer's current recommended installation procedures.
  - 4. Field adhesion test results.
- B. Qualification Data
  - 1. For products required to be installed by workers approved by product manufacturers, include letters of acceptance by product manufacturers certifying that installers are approved to apply their products.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. Installer shall have at least three years of experience in installing materials of types specified and shall have successfully completed at least three projects of similar scope and complexity.
  - 2. Installer shall designate a single individual as project foreman who shall be on site at all times during installation.
- B. Field Adhesion Test Method: Use manufacturer's standard field adhesion test methods and methods to verify proper priming and surface preparation techniques required to obtain optimum adhesion. Evaluate and report results of field adhesion testing.
- C. Waterproofing Terminology: Refer to ASTM D1079 and the manufacturer's application manual for definitions of waterproofing terms related to this section.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the job site in the manufacturer's unopened containers with all labels intact and legible at time of use. Record all product lot numbers and expiration dates. Handle and store materials in accordance with manufacturer's recommendations with proper precautions to ensure fitness of material when installed.

1.6 WARRANTY

- A. Warranty: Provide manufacturer's standard warranty for each type of product. Include written testing documentation and test reports.

PART 2 PRODUCTS

2.1 BASIS OF DESIGN MANUFACTURER

- A. Sika Corporation, 201 Polito Avenue, Lyndhurst NJ 07071. Toll Free 800-933-SIKA (7452), [www.usa.sika.com](http://www.usa.sika.com). No substitutions without prior written approval by the Engineer.

2.2 TRAFFIC COATINGS (SIKALASTIC 720-ONE SHOT VEHICULAR POLYURETHANE)

- A. Vehicular Traffic Coating: Sikalastic 720-One Shot, Integrally Textured, fast curing, aliphatic polyurethane Traffic System applied in a single step application comprised of the following:
1. Primer:
    - a. Sikalastic Primer 1C fast curing PU primer (for recoat applications only)
    - b. Sikalastic FTP LoVOC 100% solids epoxy primer (as a standard primer and for recoat applications and elevated substrates with moisture content up to 6% by Tramex).
    - c. Sikalastic PF Lo-VOC 100% solids epoxy primer (for rough and/or porous substrates).
    - d. Sikalastic MT 100% solids epoxy primer (for substrates with elevated moisture content up to 6% by Tramex).
- B. Single Coat Traffic System Applied Total Film Thickness:
1. Sikalastic 720-One Shot Polyurethane Membrane: One single coat application to 48 mils wet (WFT), 45 mils dry (DFT)
- C. Aggregate:
1. Sikalastic 720-One Shot Aliphatic Polyurethane Coating is integrally textured for slip resistance. Additional aggregate not to be added.
- D. Two-component integrally textured, fast curing, coating applied in one single coat application: Typical Physical properties complying with the following.
1. Sikalastic 720-One Shot (Aliphatic Polyurethane)
  2. Pot Life 20 minutes
  3. Total Volume Solids (ASTM D2697) 95% (including aggregate)
  4. VOC Content (ASTM D2369) 20.9 g/l
  5. Tensile Strength (ASTM D2240) 2400 +/- 100 psi
  6. Elongation at Break (ASTM D412) 800 +/- 50%
  7. Tear Resistance (Die C, ASTM D624) 300 +/- 25 pli
  8. Shore A Hardness (ASTM D2240) 90 +/- 5  
Tests were performed with material and curing conditions at 75F and 50% relative humidity.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the Work of this section. Notify Engineer in writing of any discrepancies. Commencement of the Work in an area shall mean Installer's acceptance of the substrate.

3.2 PREPARATION

- A. Substrates shall be clean, dry, sound and free of surface contaminants, with an open texture. Remove all traces of laitance, grease, oils, curing compounds, form release agents and foreign particles by mechanical means, such as shot blast, milling, grinding or scarifying. Blow surface free of all dust. If using compressed air ensure compressor is equipped with an oil and moisture trap. All projections, depressions and rough spots should be removed or dressed off to achieve a level surface prior to the application.
- B. Concrete shall be cleaned and prepared to achieve a laitance and contaminant free, open textured surface by shot blast or equivalent mechanical means (CSP 3-4 per ICRI guidelines).

3.3 PRIMING – DO NOT PROCEED WITH MEMBRANE WORK IF DECK IS OUTGASSING. CONDUCT A RUBBER MAT TEST (OR SIMILAR) TO CONFIRM NO MOISTURE OUTGASSING IS PRESENT.

- A. Concrete <4% moisture content by weight:
  - 1. Apply Sikalastic Primer at 280 sf/gal with a flat squeegee or roller and work well into the substrate to ensure adequate penetration and sealing. Do not allow primer to collect/puddle in surface depressions. No mixing required. Apply using phenolic resin core roller or similar. Allow primer to cure a minimum of 45 minutes at 70°F and 50% RH or until tack free before applying Sikalastic 720-One Shot System. Refer to data sheet for more detailed information or consult Sika for other primer options.
- B. Concrete <5% moisture content by weight:
  - 1. For concrete substrates with 5% maximum moisture content by weight, apply Sikalastic PF Lo-VOC primer at 200 sf/gal. with a flat squeegee or roller and work well into the substrate to ensure adequate penetration and sealing. Puddles are to be avoided. Premix both components. Sikalastic PF Lo-VOC Primer, Part "A" is white in color. Sikalastic PF Lo-VOC Primer, Part "B" is black in color.
  - 2. In a separate mixing vessel, add the Sikalastic PF Lo-VOC Primer, Part "B" to the Sikalastic PF Lo-VOC Part "A". Mix thoroughly with a mechanical mixer (i.e. Jiffy Mixing Paddle) for 3 minutes. This mixture will appear as a grey color.

3. Allow primer to cure a minimum of 6 hours at 70°F and 50% RH or until tack free before applying second primer or base coat.
  4. Refer to data sheet for more detailed information or consult Sika for other primer options.
- C. Concrete 4% to 6% moisture content by weight:
1. For concrete substrates with 5% maximum moisture content by weight, apply Sikalastic MT primer at 175 sf/gal. with a flat squeegee or roller and work well into the substrate to ensure adequate penetration and sealing. Puddles are to be avoided.
  2. For concrete substrates with >5% up to 6% maximum moisture content by weight, apply a second coat of Sikalastic MT primer at 175 sf/gal.
  3. Premix both components. Sikalastic MT Primer, Part "A" is red in color. Sikalastic MT Primer, Part "B" is light amber in color.
  4. Add the 1.5 gallon of Sikalastic MT Primer, Part "B" to the 3 gallons of Part "A" in the short filled Part "A" pail. Mix thoroughly with a mechanical mixer (i.e. Jiffy Mixing Paddle) for 3 minutes.
  5. This mixture will appear as a red transparent color.
  6. Allow primer to cure a minimum of 12 hours at 70°F and 50% RH or until tack free before applying second primer or base coat.
  7. For concrete substrates with 5% maximum moisture content by weight, apply Sikalastic FTP LoVOC primer at 200 sf/gal. with a flat squeegee or roller and work well into the substrate to ensure adequate penetration and sealing. Puddles are to be avoided.
  8. For concrete substrates with >5% up to 6% maximum moisture content by weight, apply a second coat of Sikalastic FTP LoVOC primer at 200 sf/gal.
  9. Premix both components.
  10. Add the 5 gallon of Sikalastic FTP LoVOC Primer, Part "B" to the 10 gallons of Part "A". Mix thoroughly with a mechanical mixer (Jiffy) for 3 minutes.
  11. This mixture will appear as a green transparent color.
  12. Allow primer to cure a minimum of 12 hours at 70°F and 50% RH or until tack free before applying second primer or base coat.
  13. Refer to data sheet for more detailed information or consult Sika for other primer options.



### 3.4 DETAILING

- A. Non-Structural Cracks up to 1/16-inch: Apply a detail coat of Sikalastic 720-One Shot at 23 mils wet 4-inch wide and centered over the crack. Allow detail coat to become tack free before overcoating.
- B. Cracks and Joints over 1/16-inch up to 1-inch: Route and seal with Sikaflex 2c Sealant and allow to skin over and cure minimum of 24 hrs. Apply a detail coat of Sikalastic 720-One Shot at 23 mils wet, 4-inch wide and centered over crack/sealant. Allow detail coat to become tack free before overcoating.

### 3.5 SINGLE COAT SIKALASTIC 720-ONE SHOT ALIPHATIC POLYURETHANE

- A. Sikalastic 720 -One Shot Integrally Textured single coat application:
  - 1. After opening Part A place lid face up on ground, remove aggregate insert and place insert on pail lid. Premix Part A component using a low speed (400–600 rpm) mechanical mixer and Jiffy Paddle (5-50 gal. model) at slow speed to obtain uniform color. Slowly add aggregate from tray into Part A and continue to mix, making sure to scrape the bottom and sides of the pail, ensure aggregate is fully mixed within the Part A.
  - 2. Slowly pour Part B into Part A while mixing so that the Part B gets pulled into the vortex of the mixing paddle. Scrape the sides of the container, Mix the combined material thoroughly for 3 minutes until a homogenous mixture and uniform color is obtained. Use care not to prevent whipping air into the material while mixing - use a slow and methodical mixing approach.
  - 3. Apply a single coat of the mixed Sikalastic 720-One Shot with a 3/8-inch notched squeegee or trowel at the recommended coverage rate of 33 sf/gal and backroll using a phenolic resin core roller. Extend single coat over entire area including previously detailed cracks and control joints. Coverage rate of 33 sf/gal should provide a wet film thickness yield of 48 mils.
  - 4. Allow coating to cure a minimum of 36 hours before opening to vehicular traffic. Consult Sika for other weather related recommendations.

3.6 CLEANING

- A. Remove uncured materials from tools or other surfaces with an approved solvent. Remove cured materials by mechanical means.
- B. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

END OF SECTION

PART 1 GENERAL

1.1 SCOPE: SECTION 07 92 00 – JOINT SEALANTS

- A. Non-sag gunnable joint sealants.
- B. Owner-provided field quality control.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include material descriptions, chemical composition, physical properties, material safety data sheets, test data, and mixing, preparation, and application instructions.

1.3 REFERENCE STANDARDS

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

PART 2 PRODUCTS

2.1 JOINT SEALANT APPLICATIONS

- A. Scope:
  - 1. Exterior Joints: Exterior joints to be sealed include, but are not limited to, the following items.
    - a. Concrete slab control joints.
    - b. Routed cracks.
    - c. CMU cracking.

2.2 CONCRETE CONTROL JOINT AND ROUTED CRACK SEALANT

- A. Type S - Polyurethane Self-Leveling Sealant: ASTM C920, Grade P, Uses T, I, M, A, G; single component; suitable for traffic exposure when recessed below traffic surface.
  - 1. Movement Capability: Plus and minus 25 percent, minimum.
  - 2. Color: White.

3. Product:

- a. Basis of Design: Sika Corporation; Sikaflex-1C SL: [www.usa.sika.com](http://www.usa.sika.com).

2.3 MASONRY CRACK SEALANT

- A. Type S – Polyurethane Non-sag Sealant: ASTM C-920, Grade NS, Uses T, NT, G, A, O, M; single component; suitable for moving joints and vertical applications.

1. Movement capability: Plus and minus 35%, minimum.

2. Color: Redwood Tan.

3. Product:

- a. Basis of Design: Sika Corporation; Sikaflex-15 LM: [www.usa.sika.com](http://www.usa.sika.com).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that joints are ready to receive work.

3.2 PREPARATION

- A. Route cracks to be sealed open to a depth and width recommended by the manufacturer instructions.

- B. Remove loose materials and foreign matter that could impair adhesion of sealant.

1. All sealant shall be removed from the joints with a radial bristle disk or other caulk removal tool. Do not damage the substrate.

2. Remove all wax residue from surface of sealant application with a solvent recommended for use on wax by the solvent manufacturer.

- C. Clean and prep joints in accordance with manufacturer's instructions.

- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.3 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- C. Non-sag Sealants: Tool surface flush, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- D. Sealant shall be applied 1/2-inch deep or until refusal unless otherwise noted by manufacturer installations instructions.

3.4 POST-OCCUPANCY

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

END OF SECTION

PART 1 GENERAL

1.1 SCOPE: SECTION 09 96 00 – HIGH PERFORMANCE COATINGS

- A. High performance coatings.
- B. Surface preparation.

1.2 REFERENCE STANDARDS

- A. SSPC-SP 2 - Hand Tool Cleaning; 2018.
- B. SSPC-SP 3 - Power Tool Cleaning; 2018.
- C. SSPC-SP 16 - Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals
- D. SSPC-SP 13 - Surface Preparation of Concrete; 1997 (Reaffirmed 2003).

1.3 SUBMITTALS

- A. Product Data: Provide complete list of all products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - 2. MPI product number (e.g. MPI #47).
  - 3. Cross-reference to specified coating system(s) product is to be used in; include description of each system.
  - 4. Manufacturer's installation instructions.
  - 5. If proposal of substitutions is allowed under submittal procedures, explanation of all substitutions proposed.
- B. Samples: Submit two color palettes illustrating colors available for selection.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. Extra Coating Materials: 2 gallons of each type and color.
  - 2. Label each container with manufacturer's name, product number, color number, and components where used.
- E. Applicator Qualifications.

#### 1.4 INFORMATION SUBMITTALS

- A. Dry mill testing results.
- B. Testing agent's certification
- C. Maintenance Data: Include cleaning procedures and repair and patching techniques.

#### 1.5 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document that applies to application on site.
- B. Applicator Qualifications: Company specializing in performing the work of this section shall have minimum 5 years documented experience.
- C. Preparatory meeting: Meet with a representative of the coating product manufacturer on site to review best practices for safe use of product, preparation of substrate and application of product. Notify owner 48 hours in advance of preparatory meeting.
  - 1. Preparatory meeting attendees will include, at minimum, contractor's project manager, City of Fairbanks project manager, all workers engaged in preparation of substrate and application of coatings, and product manufactures representative.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Coating Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.7 FIELD CONDITIONS

- A. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- B. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of coating.
- C. Restrict traffic from area where coating is being applied or is curing.

1.8 WARRANTY

- A. Correct defective Work within a one-year period after Date of Substantial Completion.
- B. Warranty: Include coverage for bond to substrate, for a five-year period.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide high performance coating products from the same manufacturer. Basis of design products are listed.

2.2 TOP COAT MATERIALS

- A. Coatings - General: Provide complete multi-coat systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses indicated by the manufacturer; number of coats specified does not include primer or filler coat.
- B. Polyurethane Coating for existing galvanized stair components:
  - 1. Number of Coats: One.
  - 2. Top Coat(s): Polyurethane, Two-Component
    - a. Sheen: Semi-Gloss
    - b. Color: Gray
    - c. Product:
      - 1) Sherwin-Williams Acrolon 218 HS, B65-650 Series:  
[www.protective.sherwin-williams.com](http://www.protective.sherwin-williams.com).



C. Polyurethane Coating for existing painted stair components and new shop fabrications:

1. Number of Coats: (1) on existing painted surfaces and (2) on primed steel.
2. Top Coat(s): Polyurethane, Two-Component
  - a. Sheen: Gloss
  - b. Color: Match existing structural steel
  - c. Product:
    - 1) Sherwin-Williams Acrolon 218 HS, B65-600 Series:  
[www.protective.sherwin-williams.com](http://www.protective.sherwin-williams.com).

2.3 PRIMERS

- A. Field applied primer: Urethane primer, MPI #107, 134
1. Coats: (1) coat applied to exposed metal surfaces.
  2. Color: Gray
  3. Product:
    - a. Sherwin-Williams; Pro Industrial Pro-Cryl Universal Primer, B66A00310 Series [www.protective.sherwin-williams.com](http://www.protective.sherwin-williams.com).

2.4 CLEANER AND ETCHER

- A. Field applied cleaner and etcher for galvanized surfaces:
1. Coats: One
  2. Product:
    - a. Great Lakes Laboratory; Clean 'n Etch, [greatlakeslaboratories.com](http://greatlakeslaboratories.com).

2.5 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of coated surfaces.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Do not begin application of coatings until substrates have been properly prepared.
- C. Verify that substrate surfaces are ready to receive work as instructed by the coating manufacturer. Obtain and follow manufacturer's instructions for examination and testing of substrates.
- D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

3.2 PREPARATION

- A. Clean surfaces of loose foreign matter.
- B. Remove substances that would bleed through finished coatings. If unremovable, seal surface with shellac.
- C. Remove finish hardware, fixture covers, and accessories and store.
- D. Painted Stair Components Coated In-Place:
  - 1. Existing Painted and Sealed Surfaces:
    - a. Protect adjacent surfaces and materials not receiving coating from spatter and overspray; mask if necessary to provide adequate protection. Repair damage.
    - b. Remove loose, flaking, and peeling paint. Feather edges and sand smooth edges of chipped paint. All surfaces to receive paint will be prepared with either SSPC-SP 2 or SSPC-SP 3 unless noted otherwise.
    - c. Preparation will be performed in a method and manner that does not penetrate the surrounding steel galvanizing.
    - d. Clean with mixture of trisodium phosphate and water to remove surface grease and foreign matter.

- E. Corroded Galvanized Stair Components:
  - 1. Protect adjacent surfaces and materials not receiving coating from spatter and overspray; mask if necessary to provide adequate protection. Repair damage. Provide temporary enclosure for in-place stripping and painting as required by Division 1 specifications.
  - 2. Remove corrosion with Hand Tool Cleaning per SSPC-SP2.
  - 3. Solvent Clean surfaces to be primed per SSPC-SP.
  - 4. Prime per 3.3 the same day as location is cleaned.
- F. Shop Painted Components:
  - 1. Shop Painted Components will be prepared with SSPC-SP 16: Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.

### 3.3 PRIMING

- A. Apply primer to all surfaces to receive painting. Apply in accordance with coating manufacturer's instructions, and 2.3.

### 3.4 COATING APPLICATION

- A. Apply coatings in accordance with manufacturer's written instructions.
- B. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture, or finish. Finish edges, crevices, corners, and other changes in dimension with full coating thickness.
- C. All non-stainless fasteners will be coated after installation with the complete coating system.
- D. If coatings are spray applied, each coat will be backrolled to a uniform thickness and texture with a nap recommended by the manufacturer except for galvanized surfaces which only need be sprayed.

### 3.5 FIELD QUALITY CONTROL

- A. Contractor will provide field inspection and testing.

- B. Dry Film Thickness Testing: After the completion of the final coat, the contractor will engage the services of a qualified testing and inspecting agency to inspect and test each coat for dry film thickness.
  - 1. At each coat the testing agent will provide tests on a minimum of 10 locations.
  - 2. The testing agent shall provide a report that describes dry mill thickness and location of each test.
  - 3. Touch up and restore coated surfaces damaged by testing.
    - a. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, and specified thickness, Contractor shall pay for retesting and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations, and specified thickness.

### 3.6 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. Clean surfaces immediately of overspray, splatter, and excess material.
- C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

### 3.7 PROTECTION

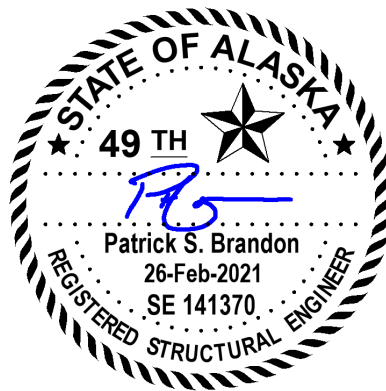
- A. Protect finished work from damage.

END OF SECTION

# Calculations

**CITY OF FAIRBANKS PARKING GARAGE  
REPAIRS  
PROJECT NO: 202001  
FAIRBANKS, ALASKA**

**STRUCTURAL CALCULATIONS  
PHASE: FINAL**



Prepared By:  
Samuel Mitchell  
Under the direct supervision of  
Patrick Brandon, PE, SE  
Feb 2021

---

## **SPANDREL BEAM REPAIR**

---

### **EXISTING CONDITIONS**

Cracks were found at Level 2, Grid A-5 along the slab and spandrel near the A-5 Column. Spalling was observed at the interface between the A-5 column and the adjacent spandrel. Along Grid 5, an expansion joint separates the slab on grade at Level 1 and the suspended slab of Level 2. This expansion joint is continuous except where the spandrel beam on the suspended slab is tied to the column at Grid A-5 with steel reinforcing, see 10/S4.3. Cracking at this location runs parallel with the spandrel, and crack widths vary from hairline to 1/4-inch in width. This issue was identified in an earlier 2008 Structural Systems Analysis Report. No repairs have been implemented since the 2008 report was published. Design Alaska measured the cracking during our inspection in May 2020 and believe the cracking has worsened from what was reported in 2008.

Through review of available documents and site inspections, we understand this cracking is the result of the second level spandrel beam being rigidly tied to the column at A-5, bridging the seismic joint. This spandrel beam, labeled SPB-01 in the original design calculations and drawings, attaches directly to the column, bridging the joint at the transition between foundation and elevated slab. It is understood the joint was included in the original design to decouple the relatively rigid slab on-grade from the less-rigid superstructure. The joint and bridging spandrel beam are shown in Figure 1.

### **NEW WORK**

The spandrel beam is to be cut free from the column and supported from a steel bracket. This is being done to protect the column from damage in a design seismic event. If left uncorrected, the spandrel can transmit considerable tensile and compressive forces to the column, potentially causing column concrete spalling, yielding, and rupture of the spandrel reinforcing steel, and potentially compromising the integrity of the column ties at the joint.

Through a thorough review of the structural calculations, as-built drawings, and construction photos, Design Alaska is confident this is the correct solution to remedy the situation. The existing seismic load resisting system has been reviewed & decoupling the spandrel from the column will neither adversely affect spandrel moment capacity, diaphragm performance, column stability, post-tensioned beam and slab capacity, and vehicle barrier capacity.

Because the spandrel beam also acts as a vehicle barrier, once cut free from the column, it will be attached to resist vehicle barrier loads in addition to its self-weight. A steel bracket fastened to the existing column carries the spandrel's self-weight and a bolted steel angle on the interior face of the spandrel will provide restraint for the 6,000 pound vehicle barrier load.

SPANDREL BEAM REPAIR

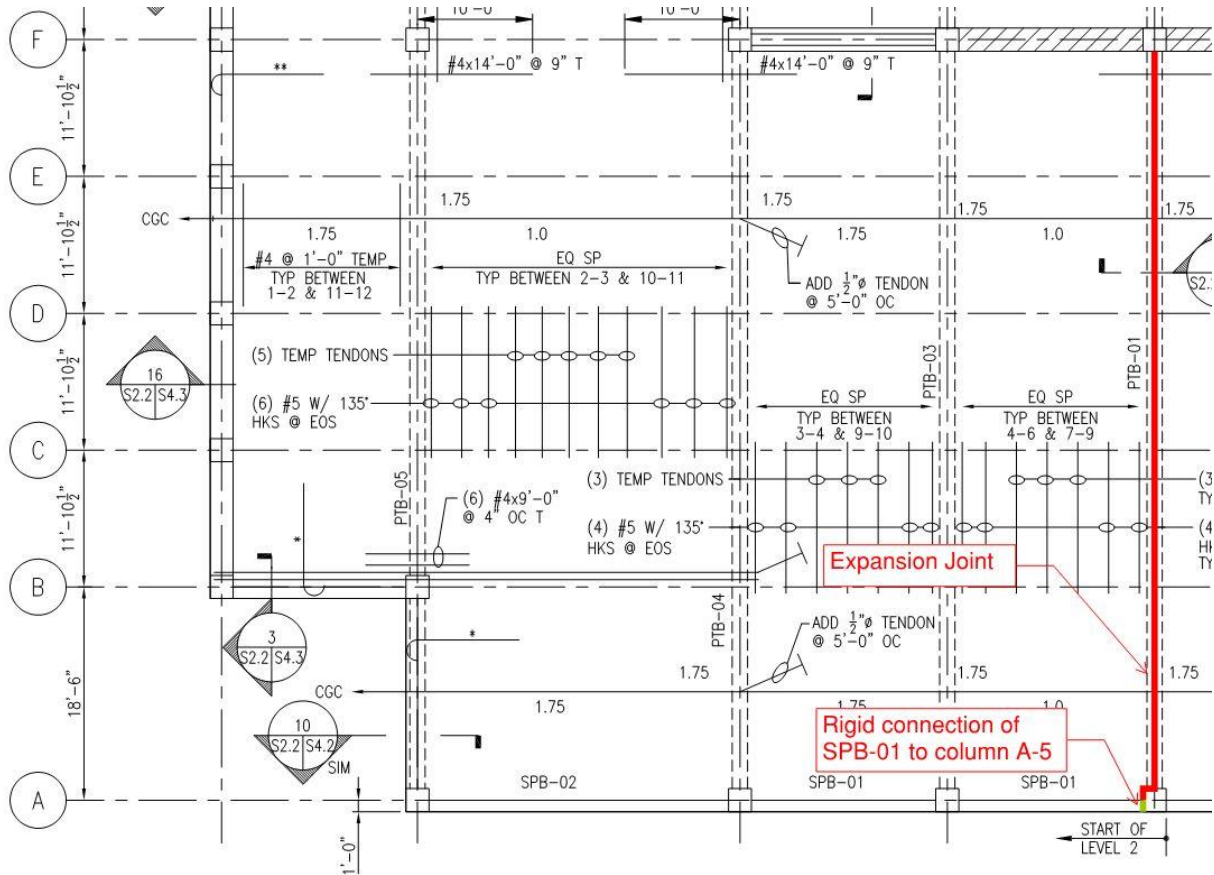


Figure 1: Expansion Joint Plan View



SPANDREL BEAM REPAIR

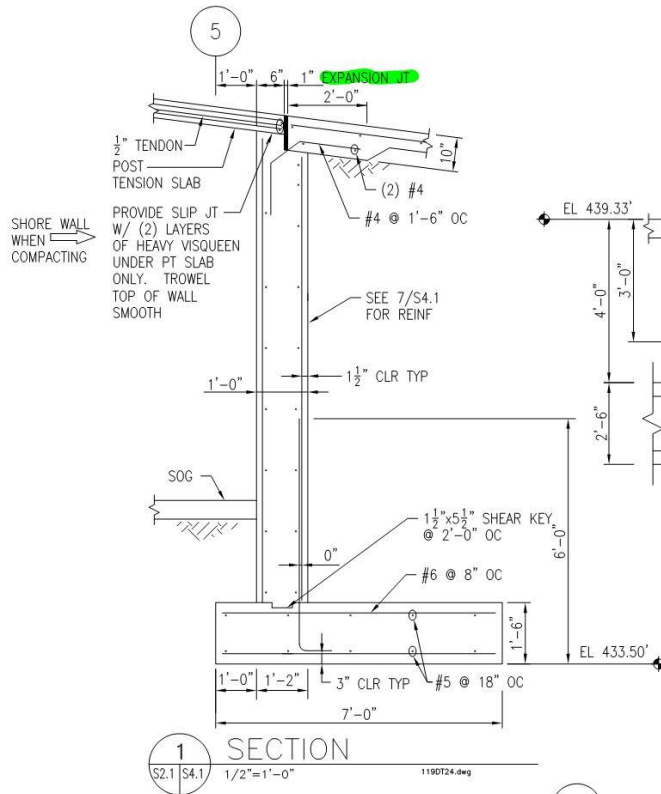


Figure 2: As-built Expansion Joint Detail

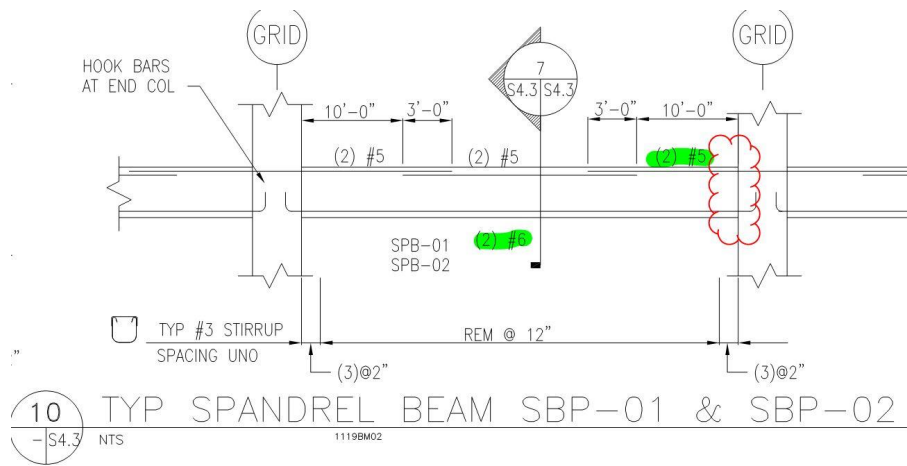


Figure 3: As-built Spandrel to Column Detail

---

**SPANDREL BEAM REPAIR**

---



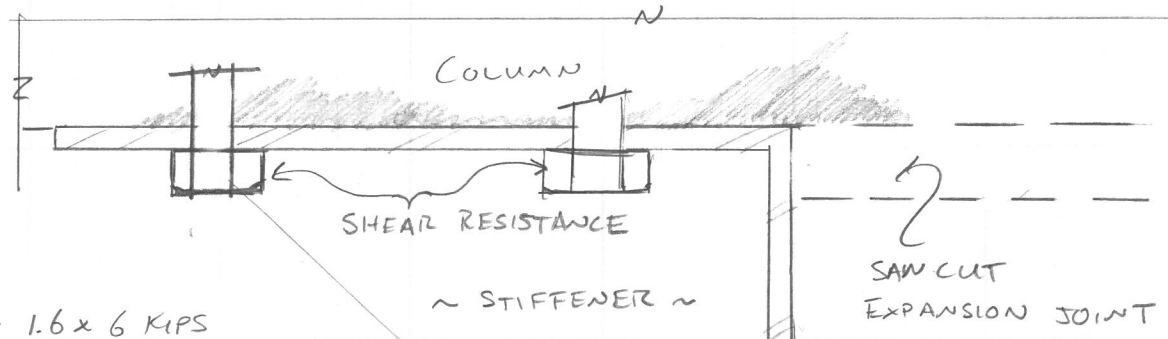
*Figure 4: Slab & Spandrel Cracking from Below*



*Figure 5: Slab & Spandrel Cracking from Above*

LOADING:

LIVE LOAD → VEHICLE BARRIER LOAD = 6000 LB  
 DEAD LOAD → SPANDREL SELF WEIGHT = 150 PCF

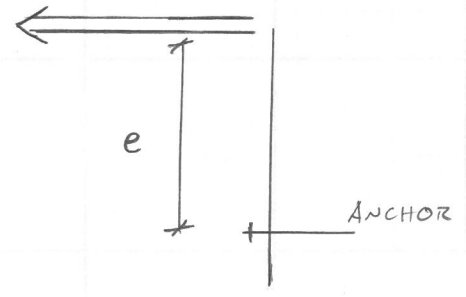


$P_u = 1.6 \times 6 \text{ KIPS}$   
 $= \underline{9.6 \text{ KIPS}}$

- > THE CONNECTION SHOWN MUST RESIST THE LIVE LOAD ONLY.
- > COLUMN CONNECTION IS SUBJECT TO SHEAR LOADING. THE SPANDREL BOLTS AND PLATE EXPERIENCE PRYING.

FREE BODY DIAGRAM

SHEAR RESISTANCE =  $P_u = 9.6 \text{ KIPS}$



PROJECT C of F PARKING GARAGECOMM. NO. 202001 MADE BY SMM DATE 10/14/2020CHECKED BY PSB DATE 2/25/2021CALCULATIONS FOR SPANDREL BEAM CONNECTIONDesign  
AlaskaSHEET NO. 2 of 4

→ ACI 318 DOES NOT PROVIDE PROVISIONS FOR THROUGH-BOLT ANCHORS.

→ DESIGN APPROACH IS TO CONSIDER TENSILE STRENGTH OF THROUGH-BOLT AND TO CHECK THE PUNCHING SHEAR OF THE CONCRETE SPANDREL BEAM WITH THE WASHER / PLATE APPROXIMATED AS AN AXIALLY LOADED COLUMN. ALSO, BENDING OF THE CONNECTION PLATE WILL NEED TO BE CHECKED.

(1) CONCRETE BEARING [ACI 318-11 10.14]

$$\text{BEARING} = \phi (0.85) f_c' A_1$$

WHERE:  $\phi = 0.65$  - BEARING ON CONCRETE

$f_c' = 5000 \text{ psi}$  - AS-BUILTS

$A_1 =$  THRU-BOLT WASHER AREA

USE 3" x 3" PLATE

$$= 0.65 (0.85) 5 \text{ ksi} \times 9 \text{ in}^2$$

$$= 24.8 \text{ KIPS}$$

→ PER ACI 318-11 10.14.1, THE BEARING VALUE MAY BE INCREASED BY  $\sqrt{A_2/A_1} \leq 2$ . WHERE  $A_2$  IS THE AREA OF THE SUPPORTING SURFACE. SINCE  $A_2 \gg A_1$ , USE AN INCREASE OF 2.

$$\text{BEARING STRENGTH} = 49.7 \text{ KIPS}$$

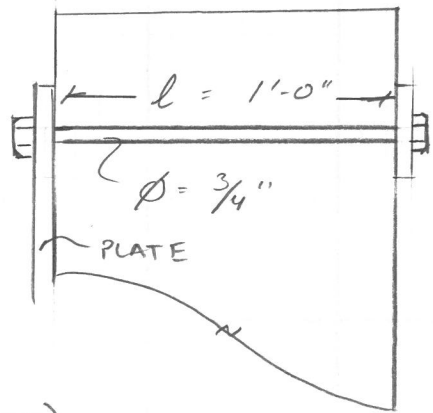
$$\text{LIVE LOAD} = P_u = 9.6 \text{ KIPS} \leq \text{BEARING STRENGTH}$$

∴ O.K. IN BEARING

(2) CHECK THRU BOLT TENSILE CAPACITY

- > USE  $3/4"$   $\phi$  THRU-BOLT
- > THE TENSION EXPERIENCED BY THE BOLT EQUALS THE INDUCED LOAD.

$$T_{BOLT} = 9.6 \text{ KIPS} / 3 \text{ BOLTS} = 3.2 \text{ K/BOLT}$$



A) PURE TENSION OF BOLTS

$$\phi R_n = 0.75 \cdot F_{nt} \cdot A_b$$

-> "GROUP A" BOLTS (A325)

$$= 0.75 \cdot 90 \text{ KSI} \cdot 0.351 \text{ in}^2$$

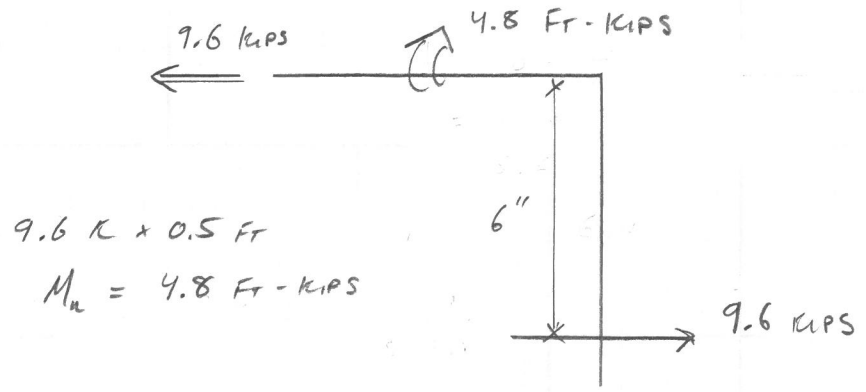
$$= 23.7 \text{ KIPS}$$

$\therefore$  SUFFICIENT IN TENSION

B) PLATE DESIGN

$\Rightarrow$  ASSUME CONNECTION MOMENT IS DEVELOPED BY CONNECTION AT COLUMN.

USE  $1/2"$  PLATE  $\Rightarrow$  O.K. BY INSP.



PROJECT C2F PARKING GARAGE

COMM. NO. 202001

MADE BY SMM

DATE 10/15/20

**Design  
Alaska**

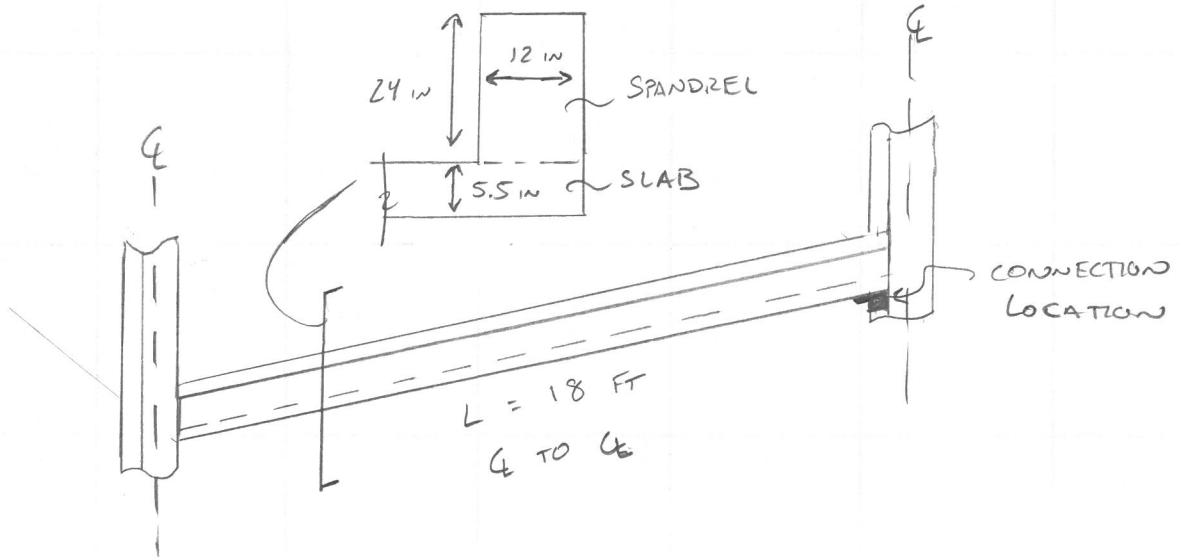
CHECKED BY PSB

DATE 2/25/2021

CALCULATIONS FOR SPANDREL SUPPORT

SHEET NO. 4 of 4

DESIGN THE BRACKET THAT SUPPORTS THE GRAVITY LOAD



DEAD LOAD {

UNIT WEIGHT = 150 PCF

SPANDREL = 150 PCF × 1 FT × 2 FT × 18 FT = 5.4 KIPS

SLAB = 150 PCF × 0.458 FT × 3 FT × 18 FT = 3.7 KIPS

↳ CONSIDER 3' FT OF SLAB TRIBUTARY TO SPANDREL

LIVE LOAD {

PARKING GARAGE LIVE LOAD = 40 PSF

TRIB WIDTH = 3 FT

LIVE LOAD = 40 PSF × 3 FT × 18 FT = 2.16 K

TOTAL LOAD {

$$P_u = \frac{1}{2} (1.2 P_D + 1.6 P_L)$$

$$= 0.5 (1.2 \times (5.4 + 3.7) \text{ KIPS} + 1.6 (2.16 \text{ KIPS}))$$

∴  $P_u = 7.2 \text{ KIPS}$

FOR 10" BEARING WIDTH  $e = 5 \text{ IN}$

∴  $M_u = 36,000 \text{ IN-LB}$

⇒ ENTER INTO HILTI

www.hilti.com

Company:  
 Address:  
 Phone | Fax: |  
 Design: 202001 - SPANDREL BRACKET CONNECTION  
 Fastening point:

Page: 1  
 Specifier:  
 E-Mail:  
 Date: 2/26/2021

**Specifier's comments:**

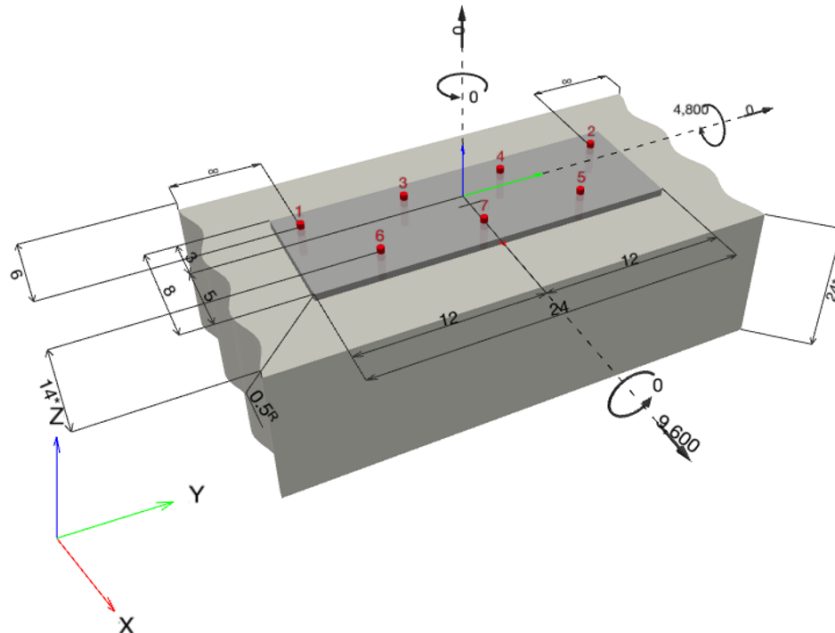
**1 Input data**

<b>Anchor type and diameter:</b>	<b>KWIK HUS-EZ (KH-EZ) 1/2 (2 1/4)</b>
Item number:	418071 KH-EZ 1/2"x3"
Effective embedment depth:	$h_{ef,act} = 1.520$ in., $h_{nom} = 2.250$ in.
Material:	Carbon Steel
Evaluation Service Report:	ESR-3027
Issued   Valid:	7/1/2020   12/1/2021
Proof:	Design Method ACI 318-11 / Mech.
Stand-off installation:	$e_b = 0.000$ in. (no stand-off); $t = 0.500$ in.
Anchor plate <sup>R</sup> :	$l_x \times l_y \times t = 8.000$ in. x $24.000$ in. x $0.500$ in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, 5000, $f'_c = 5,000$ psi; $h = 24.000$ in.
<b>Installation:</b>	<b>hammer drilled hole, Installation condition: Dry</b>
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar



<sup>R</sup> - The anchor calculation is based on a rigid anchor plate assumption.

**Geometry [in.] & Loading [lb, in.lb]**



www.hilti.com

Company:		Page:	2
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	202001 - SPANDREL BRACKET CONNECTION	Date:	2/26/2021
Fastening point:			

**1.1 Design results**

Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 0; V <sub>x</sub> = 9,600; V <sub>y</sub> = 0; M <sub>x</sub> = 0; M <sub>y</sub> = 4,800; M <sub>z</sub> = 0;	no	88

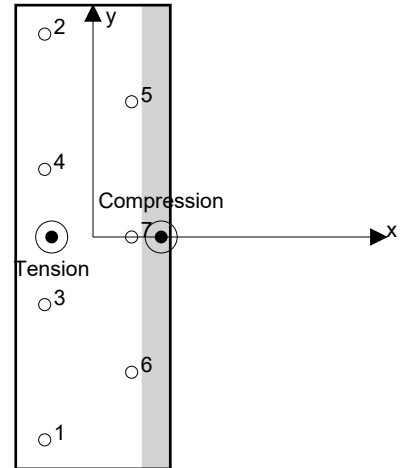
**2 Load case/Resulting anchor forces**

**Anchor reactions [lb]**

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	195	1,371	1,371	0
2	195	1,371	1,371	0
3	195	1,371	1,371	0
4	195	1,371	1,371	0
5	23	1,371	1,371	0
6	23	1,371	1,371	0
7	23	1,371	1,371	0

max. concrete compressive strain: 0.01 [‰]  
 max. concrete compressive stress: 50 [psi]  
 resulting tension force in (x/y)=(-2.139/-0.000): 847 [lb]  
 resulting compression force in (x/y)=(3.531/-0.000): 847 [lb]



Anchor forces are calculated based on the assumption of a rigid anchor plate.

**3 Tension load**

	Load N <sub>ua</sub> [lb]	Capacity $\phi$ N <sub>n</sub> [lb]	Utilization $\beta_N = N_{ua}/\phi N_n$	Status
Steel Strength*	195	11,778	2	OK
Pullout Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Failure**	847	6,058	14	OK

\* highest loaded anchor    \*\*anchor group (anchors in tension)



[www.hilti.com](http://www.hilti.com)

Company:		Page:	3
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	202001 - SPANDREL BRACKET CONNECTION	Date:	2/26/2021
Fastening point:			

### 3.1 Steel Strength

$N_{sa}$  = ESR value refer to ICC-ES ESR-3027  
 $\phi N_{sa} \geq N_{ua}$  ACI 318-11 Table D.4.1.1

#### Variables

$A_{se,N}$ [in. <sup>2</sup> ]	$f_{uta}$ [psi]
0.16	112,540

#### Calculations

$N_{sa}$ [lb]
18,120

#### Results

$N_{sa}$ [lb]	$\phi_{steel}$	$\phi N_{sa}$ [lb]	$N_{ua}$ [lb]
18,120	0.650	11,778	195

### 3.2 Concrete Breakout Failure

$N_{cbg} = \left( \frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$  ACI 318-11 Eq. (D-4)  
 $\phi N_{cbg} \geq N_{ua}$  ACI 318-11 Table D.4.1.1  
 $A_{Nc0} = 9 h_{ef}^2$  ACI 318-11 Eq. (D-5)  
 $\psi_{ec,N} = \left( \frac{1}{1 + \frac{2 e_N}{3 h_{ef}}} \right) \leq 1.0$  ACI 318-11 Eq. (D-8)  
 $\psi_{ed,N} = 0.7 + 0.3 \left( \frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0$  ACI 318-11 Eq. (D-10)  
 $\psi_{cp,N} = \text{MAX} \left( \frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0$  ACI 318-11 Eq. (D-12)  
 $N_b = k_c \lambda_a \sqrt{f_c} h_{ef}^{1.5}$  ACI 318-11 Eq. (D-6)

#### Variables

$h_{ef}$ [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
1.520	1.567	0.000	6.000	1.000
$c_{ac}$ [in.]	$k_c$	$\lambda_a$	$f_c$ [psi]	
2.750	17	1.000	5,000	

#### Calculations

$A_{Nc}$ [in. <sup>2</sup> ]	$A_{Nc0}$ [in. <sup>2</sup> ]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	$N_b$ [lb]
145.17	20.79	0.593	1.000	1.000	1.000	2,253

#### Results

$N_{cbg}$ [lb]	$\phi_{concrete}$	$\phi N_{cbg}$ [lb]	$N_{ua}$ [lb]
9,320	0.650	6,058	847



www.hilti.com

Company:		Page:	4
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	202001 - SPANDREL BRACKET CONNECTION	Date:	2/26/2021
Fastening point:			

### 4 Shear load

	Load $V_{ua}$ [lb]	Capacity $\phi V_n$ [lb]	Utilization $\beta_v = V_{ua} / \phi V_n$	Status
Steel Strength*	1,371	5,547	25	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength**	9,600	11,009	88	OK
Concrete edge failure in direction x+**	9,600	21,373	45	OK

\* highest loaded anchor    \*\*anchor group (relevant anchors)

#### 4.1 Steel Strength

$V_{sa}$  = ESR value      refer to ICC-ES ESR-3027  
 $\phi V_{steel} \geq V_{ua}$       ACI 318-11 Table D.4.1.1

#### Variables

$A_{se,V}$ [in. <sup>2</sup> ]	$f_{uta}$ [psi]
0.16	112,540

#### Calculations

$V_{sa}$ [lb]
9,245

#### Results

$V_{sa}$ [lb]	$\phi_{steel}$	$\phi V_{sa}$ [lb]	$V_{ua}$ [lb]
9,245	0.600	5,547	1,371

[www.hilti.com](http://www.hilti.com)

Company:		Page:	5
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	202001 - SPANDREL BRACKET CONNECTION	Date:	2/26/2021
Fastening point:			

**4.2 Pryout Strength**

$$V_{cp,g} = k_{cp} \left[ \left( \frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \right] \quad \text{ACI 318-11 Eq. (D-41)}$$

$$\phi V_{cp,g} \geq V_{ua} \quad \text{ACI 318-11 Table D.4.1.1}$$

$$A_{Nc} \text{ see ACI 318-11, Part D.5.2.1, Fig. RD.5.2.1(b)}$$

$$A_{Nc0} = 9 h_{ef}^2 \quad \text{ACI 318-11 Eq. (D-5)}$$

$$\psi_{ec,N} = \left( \frac{1}{1 + \frac{2 e_N}{3 h_{ef}}} \right) \leq 1.0 \quad \text{ACI 318-11 Eq. (D-8)}$$

$$\psi_{ed,N} = 0.7 + 0.3 \left( \frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0 \quad \text{ACI 318-11 Eq. (D-10)}$$

$$\psi_{cp,N} = \text{MAX} \left( \frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0 \quad \text{ACI 318-11 Eq. (D-12)}$$

$$N_b = k_c \lambda_a \sqrt{f_c} h_{ef}^{1.5} \quad \text{ACI 318-11 Eq. (D-6)}$$

**Variables**

$k_{cp}$	$h_{ef}$ [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]
1	1.520	0.000	0.000	6.000
$\psi_{c,N}$	$c_{ac}$ [in.]	$k_c$	$\lambda_a$	$f_c$ [psi]
1.000	2.750	17	1.000	5,000

**Calculations**

$A_{Nc}$ [in. <sup>2</sup> ]	$A_{Nc0}$ [in. <sup>2</sup> ]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	$N_b$ [lb]
145.17	20.79	1.000	1.000	1.000	1.000	2,253

**Results**

$V_{cp,g}$ [lb]	$\phi_{concrete}$	$\phi V_{cp,g}$ [lb]	$V_{ua}$ [lb]
15,727	0.700	11,009	9,600

**www.hilti.com**

Company:		Page:	6
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	202001 - SPANDREL BRACKET CONNECTION	Date:	2/26/2021
Fastening point:			

**4.3 Concrete edge failure in direction x+**

$$V_{cbg} = \left( \frac{A_{Vc}}{A_{Vc0}} \right) \Psi_{ec,V} \Psi_{ed,V} \Psi_{c,V} \Psi_{h,V} \Psi_{parallel,V} V_b \quad \text{ACI 318-11 Eq. (D-31)}$$

$$\phi V_{cbg} \geq V_{ua} \quad \text{ACI 318-11 Table D.4.1.1}$$

 $A_{Vc}$  see ACI 318-11, Part D.6.2.1, Fig. RD.6.2.1(b)

$$A_{Vc0} = 4.5 c_{a1}^2 \quad \text{ACI 318-11 Eq. (D-32)}$$

$$\Psi_{ec,V} = \left( \frac{1}{1 + \frac{2e_v}{3c_{a1}}} \right) \leq 1.0 \quad \text{ACI 318-11 Eq. (D-36)}$$

$$\Psi_{ed,V} = 0.7 + 0.3 \left( \frac{c_{a2}}{1.5c_{a1}} \right) \leq 1.0 \quad \text{ACI 318-11 Eq. (D-38)}$$

$$\Psi_{h,V} = \sqrt{\frac{1.5c_{a1}}{h_a}} \geq 1.0 \quad \text{ACI 318-11 Eq. (D-39)}$$

$$V_b = \left( 7 \left( \frac{l_e}{d_a} \right)^{0.2} \sqrt{d_a} \right) \lambda_a \sqrt{f'_c} c_{a1}^{1.5} \quad \text{ACI 318-11 Eq. (D-33)}$$

**Variables**

$c_{a1}$ [in.]	$c_{a2}$ [in.]	$e_{cV}$ [in.]	$\Psi_{c,V}$	$h_a$ [in.]
14.000	-	0.000	1.000	24.000
$l_e$ [in.]	$\lambda_a$	$d_a$ [in.]	$f'_c$ [psi]	$\Psi_{parallel,V}$
1.520	1.000	0.500	5,000	1.000

**Calculations**

$A_{Vc}$ [in. <sup>2</sup> ]	$A_{Vc0}$ [in. <sup>2</sup> ]	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{h,V}$	$V_b$ [lb]
1,176.00	882.00	1.000	1.000	1.000	22,900

**Results**

$V_{cbg}$ [lb]	$\phi_{concrete}$	$\phi V_{cbg}$ [lb]	$V_{ua}$ [lb]
30,533	0.700	21,373	9,600

**5 Combined tension and shear loads**

$\beta_N$	$\beta_V$	$\zeta$	Utilization $\beta_{N,V}$ [%]	Status
0.140	0.872	5/3	84	OK

$$\beta_{NV} = \beta_N^{\zeta} + \beta_V^{\zeta} \leq 1$$



www.hilti.com

---

Company:		Page:	7
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	202001 - SPANDREL BRACKET CONNECTION	Date:	2/26/2021
Fastening point:			

---

## 6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2018, ETAG 001/Annex C, EOTA TR029 etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- Refer to the manufacturer's product literature for cleaning and installation instructions.
- For additional information about ACI 318 strength design provisions, please go to <https://submittals.us.hilti.com/PROFISAnchorDesignGuide/>
- Hilti post-installed anchors shall be installed in accordance with the Hilti Manufacturer's Printed Installation Instructions (MPII). Reference ACI 318-11, Part D.9.1

**Fastening meets the design criteria!**

www.hilti.com

Company:  
 Address:  
 Phone | Fax: |  
 Design: 202001 - SPANDREL BRACKET CONNECTION  
 Fastening point:

Page: 8  
 Specifier:  
 E-Mail:  
 Date: 2/26/2021

## 7 Installation data

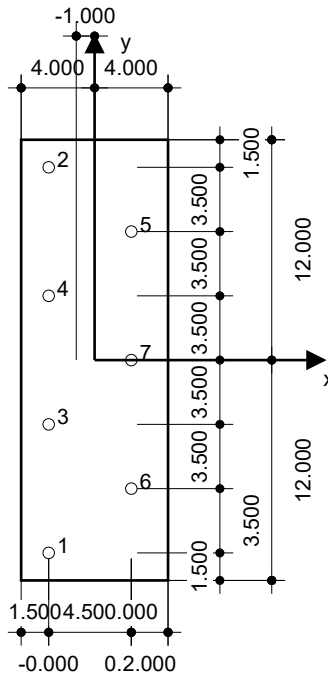
Profile: no profile  
 Hole diameter in the fixture:  $d_f = 0.625$  in.  
 Plate thickness (input): 0.500 in.  
 Recommended plate thickness: not calculated  
 Drilling method: Hammer drilled  
 Cleaning: Manual cleaning of the drilled hole according to instructions for use is required.

Anchor type and diameter: KWIK HUS-EZ (KH-EZ) 1/2 (2 1/4)  
 Item number: 418071 KH-EZ 1/2"x3"  
 Installation torque: 540 in.lb  
 Hole diameter in the base material: 0.500 in.  
 Hole depth in the base material: 2.625 in.  
 Minimum thickness of the base material: 4.500 in.

Hilti KH-EZ screw anchor with 2.25 in embedment, 1/2 (2 1/4), Carbon steel, installation per ESR-3027

### 7.1 Recommended accessories

Drilling	Cleaning	Setting
<ul style="list-style-type: none"> <li>Suitable Rotary Hammer</li> <li>Properly sized drill bit</li> </ul>	<ul style="list-style-type: none"> <li>Manual blow-out pump</li> </ul>	<ul style="list-style-type: none"> <li>Torque wrench</li> </ul>



Coordinates Anchor [in.]

Anchor	x	y	C <sub>-x</sub>	C <sub>+x</sub>	C <sub>-y</sub>	C <sub>+y</sub>	Anchor	x	y	C <sub>-x</sub>	C <sub>+x</sub>	C <sub>-y</sub>	C <sub>+y</sub>
1	-2.500	-10.500	6.000	18.500	-	-	5	2.000	7.000	10.500	14.000	-	-
2	-2.500	10.500	6.000	18.500	-	-	6	2.000	-7.000	10.500	14.000	-	-
3	-2.500	-3.500	6.000	18.500	-	-	7	2.000	0.000	10.500	14.000	-	-
4	-2.500	3.500	6.000	18.500	-	-							

Input data and results must be checked for conformity with the existing conditions and for plausibility!  
 PROFIS Engineering (c) 2003-2021 Hilti AG, FL-9494 Schaan Hilti is a registered Trademark of Hilti AG, Schaan



www.hilti.com

---

Company:		Page:	9
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	202001 - SPANDREL BRACKET CONNECTION	Date:	2/26/2021
Fastening point:			

---

## 8 Remarks; Your Cooperation Duties

- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.

www.hilti.com

Company:  
 Address:  
 Phone | Fax: |  
 Design: 202001 - SPANDREL GRAVITY BRACKET  
 Fastening point:

Page: 1  
 Specifier:  
 E-Mail:  
 Date: 2/26/2021

**Specifier's comments:**

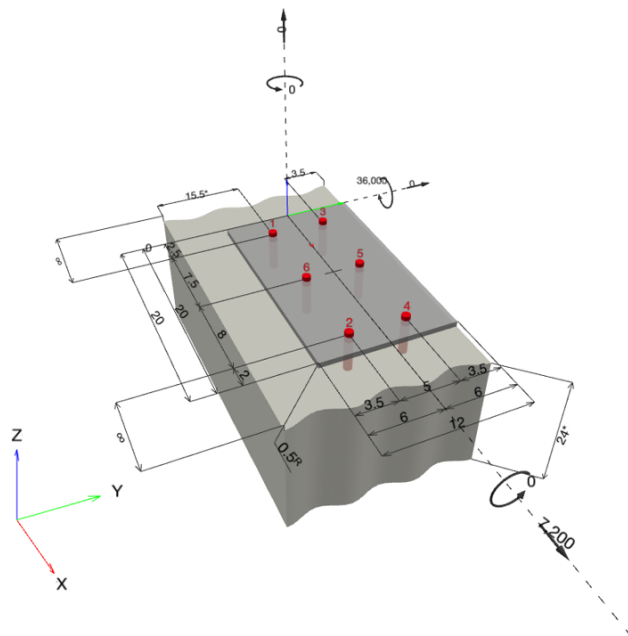
**1 Input data**

<b>Anchor type and diameter:</b>	<b>KWIK HUS-EZ (KH-EZ) 3/4 (4)</b>
Item number:	418083 KH-EZ 3/4"x4 1/2"
Effective embedment depth:	$h_{ef,act} = 2.920$ in., $h_{nom} = 4.000$ in.
Material:	Carbon Steel
Evaluation Service Report:	ESR-3027
Issued   Valid:	7/1/2020   12/1/2021
Proof:	Design Method ACI 318-11 / Mech.
Stand-off installation:	$e_b = 0.000$ in. (no stand-off); $t = 0.500$ in.
Anchor plate <sup>R</sup> :	$l_x \times l_y \times t = 20.000$ in. x $12.000$ in. x $0.500$ in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, 5000, $f'_c = 5,000$ psi; $h = 24.000$ in.
<b>Installation:</b>	<b>hammer drilled hole, Installation condition: Dry</b>
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar



<sup>R</sup> - The anchor calculation is based on a rigid anchor plate assumption.

**Geometry [in.] & Loading [lb, in.lb]**





www.hilti.com

Company:		Page:	2
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	202001 - SPANDREL GRAVITY BRACKET	Date:	2/26/2021
Fastening point:			

**1.1 Design results**

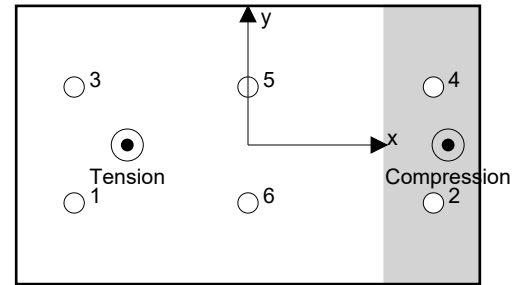
Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 0; V <sub>x</sub> = 7,200; V <sub>y</sub> = 0; M <sub>x</sub> = 0; M <sub>y</sub> = 36,000; M <sub>z</sub> = 0;	no	57

**2 Load case/Resulting anchor forces**

**Anchor reactions [lb]**

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	903	1,200	1,200	0
2	0	1,200	1,200	0
3	903	1,200	1,200	0
4	0	1,200	1,200	0
5	398	1,200	1,200	0
6	398	1,200	1,200	0



max. concrete compressive strain: 0.02 [%o]  
 max. concrete compressive stress: 106 [psi]  
 resulting tension force in (x/y)=(-5.207/0.000): 2,601 [lb]  
 resulting compression force in (x/y)=(8.633/0.000): 2,601 [lb]

Anchor forces are calculated based on the assumption of a rigid anchor plate.

**3 Tension load**

	Load N <sub>ua</sub> [lb]	Capacity $\phi N_n$ [lb]	Utilization $\beta_N = N_{ua} / \phi N_n$	Status
Steel Strength*	903	20,808	5	OK
Pullout Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Failure**	2,601	7,503	35	OK

\* highest loaded anchor    \*\*anchor group (anchors in tension)

**www.hilti.com**

Company:  
 Address:  
 Phone | Fax: |  
 Design: 202001 - SPANDREL GRAVITY BRACKET  
 Fastening point:

Page: 3  
 Specifier:  
 E-Mail:  
 Date: 2/26/2021

**3.1 Steel Strength**

$N_{sa}$  = ESR value refer to ICC-ES ESR-3027  
 $\phi N_{sa} \geq N_{ua}$  ACI 318-11 Table D.4.1.1

**Variables**

$A_{se,N}$ [in. <sup>2</sup> ]	$f_{uta}$ [psi]
0.39	81,600

**Calculations**

$N_{sa}$ [lb]
32,013

**Results**

$N_{sa}$ [lb]	$\phi_{steel}$	$\phi N_{sa}$ [lb]	$N_{ua}$ [lb]
32,013	0.650	20,808	903

**3.2 Concrete Breakout Failure**

$N_{cbg} = \left( \frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$  ACI 318-11 Eq. (D-4)  
 $\phi N_{cbg} \geq N_{ua}$  ACI 318-11 Table D.4.1.1  
 $A_{Nc0} = 9 h_{ef}^2$  ACI 318-11 Eq. (D-5)  
 $\psi_{ec,N} = \left( \frac{1}{1 + \frac{2 e_N}{3 h_{ef}}} \right) \leq 1.0$  ACI 318-11 Eq. (D-8)  
 $\psi_{ed,N} = 0.7 + 0.3 \left( \frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0$  ACI 318-11 Eq. (D-10)  
 $\psi_{cp,N} = \text{MAX} \left( \frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0$  ACI 318-11 Eq. (D-12)  
 $N_b = k_c \lambda_a \sqrt{f_c} h_{ef}^{1.5}$  ACI 318-11 Eq. (D-6)

**Variables**

$h_{ef}$ [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
2.920	1.457	0.000	3.500	1.000
$c_{ac}$ [in.]	$k_c$	$\lambda_a$	$f_c$ [psi]	
4.410	17	1.000	5,000	

**Calculations**

$A_{Nc}$ [in. <sup>2</sup> ]	$A_{Nc0}$ [in. <sup>2</sup> ]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	$N_b$ [lb]
209.43	76.74	0.750	1.000	0.940	1.000	5,998

**Results**

$N_{cbg}$ [lb]	$\phi_{concrete}$	$\phi N_{cbg}$ [lb]	$N_{ua}$ [lb]
11,543	0.650	7,503	2,601



www.hilti.com

Company:		Page:	4
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	202001 - SPANDREL GRAVITY BRACKET	Date:	2/26/2021
Fastening point:			

### 4 Shear load

	Load $V_{ua}$ [lb]	Capacity $\phi V_n$ [lb]	Utilization $\beta_v = V_{ua} / \phi V_n$	Status
Steel Strength*	1,200	9,996	13	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength**	7,200	32,132	23	OK
Concrete edge failure in direction y+**	7,200	12,770	57	OK

\* highest loaded anchor    \*\*anchor group (relevant anchors)

#### 4.1 Steel Strength

$V_{sa}$  = ESR value      refer to ICC-ES ESR-3027  
 $\phi V_{steel} \geq V_{ua}$       ACI 318-11 Table D.4.1.1

#### Variables

$A_{se,V}$ [in. <sup>2</sup> ]	$f_{uta}$ [psi]
0.39	81,600

#### Calculations

$V_{sa}$ [lb]
16,660

#### Results

$V_{sa}$ [lb]	$\phi_{steel}$	$\phi V_{sa}$ [lb]	$V_{ua}$ [lb]
16,660	0.600	9,996	1,200

[www.hilti.com](http://www.hilti.com)

Company:		Page:	5
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	202001 - SPANDREL GRAVITY BRACKET	Date:	2/26/2021
Fastening point:			

**4.2 Pryout Strength**

$$V_{cp,g} = k_{cp} \left[ \left( \frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \right] \quad \text{ACI 318-11 Eq. (D-41)}$$

$$\phi V_{cp,g} \geq V_{ua} \quad \text{ACI 318-11 Table D.4.1.1}$$

 $A_{Nc}$  see ACI 318-11, Part D.5.2.1, Fig. RD.5.2.1(b)

$$A_{Nc0} = 9 h_{ef}^2 \quad \text{ACI 318-11 Eq. (D-5)}$$

$$\psi_{ec,N} = \left( \frac{1}{1 + \frac{2 e_N}{3 h_{ef}}} \right) \leq 1.0 \quad \text{ACI 318-11 Eq. (D-8)}$$

$$\psi_{ed,N} = 0.7 + 0.3 \left( \frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0 \quad \text{ACI 318-11 Eq. (D-10)}$$

$$\psi_{cp,N} = \text{MAX} \left( \frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0 \quad \text{ACI 318-11 Eq. (D-12)}$$

$$N_b = k_c \lambda_a \sqrt{f_c} h_{ef}^{1.5} \quad \text{ACI 318-11 Eq. (D-6)}$$

**Variables**

$k_{cp}$	$h_{ef}$ [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]
2	2.920	0.000	0.000	3.500
$\psi_{c,N}$	$c_{ac}$ [in.]	$k_c$	$\lambda_a$	$f_c$ [psi]
1.000	4.410	17	1.000	5,000

**Calculations**

$A_{Nc}$ [in. <sup>2</sup> ]	$A_{Nc0}$ [in. <sup>2</sup> ]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	$N_b$ [lb]
312.47	76.74	1.000	1.000	0.940	1.000	5,998

**Results**

$V_{cp,g}$ [lb]	$\phi_{concrete}$	$\phi V_{cp,g}$ [lb]	$V_{ua}$ [lb]
45,903	0.700	32,132	7,200

**www.hilti.com**

Company:		Page:	6
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	202001 - SPANDREL GRAVITY BRACKET	Date:	2/26/2021
Fastening point:			

**4.3 Concrete edge failure in direction y+**

$$V_{cbg} = \left( \frac{A_{Vc}}{A_{Vc0}} \right) \Psi_{ec,V} \Psi_{ed,V} \Psi_{c,V} \Psi_{h,V} \Psi_{parallel,V} V_b \quad \text{ACI 318-11 Eq. (D-31)}$$

$$\phi V_{cbg} \geq V_{ua} \quad \text{ACI 318-11 Table D.4.1.1}$$

 $A_{Vc}$  see ACI 318-11, Part D.6.2.1, Fig. RD.6.2.1(b)

$$A_{Vc0} = 4.5 c_{a1}^2 \quad \text{ACI 318-11 Eq. (D-32)}$$

$$\Psi_{ec,V} = \left( \frac{1}{1 + \frac{2e_v}{3c_{a1}}} \right) \leq 1.0 \quad \text{ACI 318-11 Eq. (D-36)}$$

$$\Psi_{ed,V} = 0.7 + 0.3 \left( \frac{c_{a2}}{1.5c_{a1}} \right) \leq 1.0 \quad \text{ACI 318-11 Eq. (D-38)}$$

$$\Psi_{h,V} = \sqrt{\frac{1.5c_{a1}}{h_a}} \geq 1.0 \quad \text{ACI 318-11 Eq. (D-39)}$$

$$V_b = \left( 7 \left( \frac{l_e}{d_a} \right)^{0.2} \sqrt{d_a} \right) \lambda_a \sqrt{f'_c} c_{a1}^{1.5} \quad \text{ACI 318-11 Eq. (D-33)}$$

**Variables**

$c_{a1}$ [in.]	$c_{a2}$ [in.]	$e_{cV}$ [in.]	$\Psi_{c,V}$	$h_a$ [in.]
3.500	-	0.000	1.000	24.000
$l_e$ [in.]	$\lambda_a$	$d_a$ [in.]	$f'_c$ [psi]	$\Psi_{parallel,V}$
2.920	1.000	0.750	5,000	2.000

**Calculations**

$A_{Vc}$ [in. <sup>2</sup> ]	$A_{Vc0}$ [in. <sup>2</sup> ]	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{h,V}$	$V_b$ [lb]
136.50	55.12	1.000	1.000	1.000	3,684

**Results**

$V_{cbg}$ [lb]	$\phi_{concrete}$	$\phi V_{cbg}$ [lb]	$V_{ua}$ [lb]
18,243	0.700	12,770	7,200

**5 Combined tension and shear loads**

$\beta_N$	$\beta_V$	$\zeta$	Utilization $\beta_{N,V}$ [%]	Status
0.347	0.564	5/3	56	OK

$$\beta_{NV} = \beta_N^{\zeta} + \beta_V^{\zeta} \leq 1$$



www.hilti.com

---

Company:		Page:	7
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	202001 - SPANDREL GRAVITY BRACKET	Date:	2/26/2021
Fastening point:			

---

## 6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2018, ETAG 001/Annex C, EOTA TR029 etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- Refer to the manufacturer's product literature for cleaning and installation instructions.
- For additional information about ACI 318 strength design provisions, please go to <https://submittals.us.hilti.com/PROFISAnchorDesignGuide/>
- Hilti post-installed anchors shall be installed in accordance with the Hilti Manufacturer's Printed Installation Instructions (MPII). Reference ACI 318-11, Part D.9.1

**Fastening meets the design criteria!**

www.hilti.com

Company:  
 Address:  
 Phone | Fax: |  
 Design: 202001 - SPANDREL GRAVITY BRACKET  
 Fastening point:

Page: 8  
 Specifier:  
 E-Mail:  
 Date: 2/26/2021

## 7 Installation data

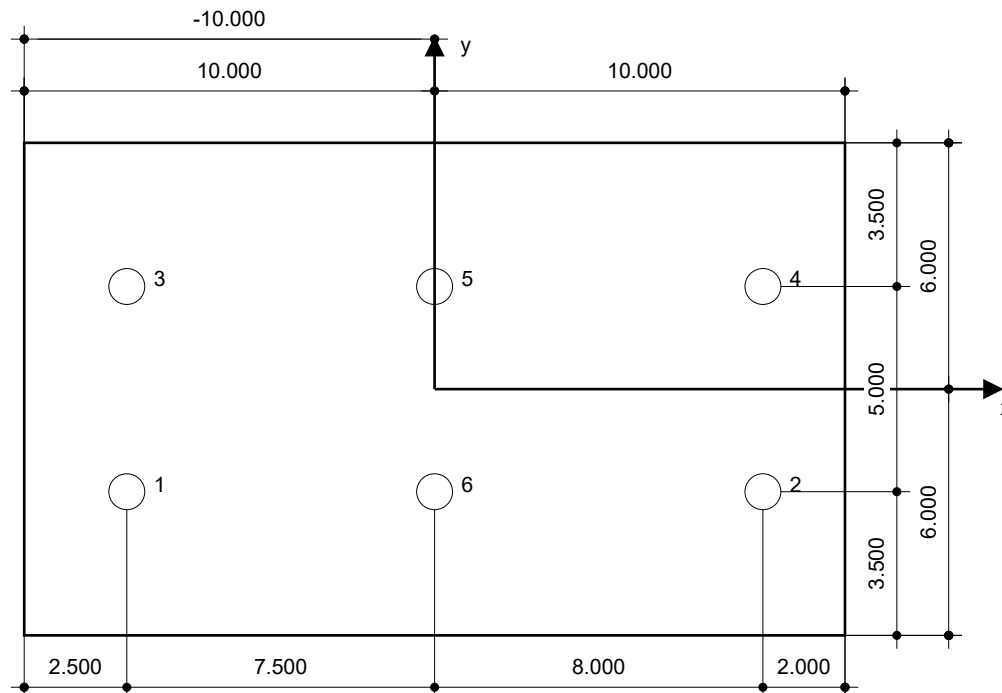
Profile: no profile  
 Hole diameter in the fixture:  $d_f = 0.875$  in.  
 Plate thickness (input): 0.500 in.  
 Recommended plate thickness: not calculated  
 Drilling method: Hammer drilled  
 Cleaning: Manual cleaning of the drilled hole according to instructions for use is required.

Anchor type and diameter: KWIK HUS-EZ (KH-EZ) 3/4 (4)  
 Item number: 418083 KH-EZ 3/4"x4 1/2"  
 Installation torque: 1,140 in.lb  
 Hole diameter in the base material: 0.750 in.  
 Hole depth in the base material: 4.375 in.  
 Minimum thickness of the base material: 6.000 in.

Hilti KH-EZ screw anchor with 4 in embedment, 3/4 (4), Carbon steel, installation per ESR-3027

### 7.1 Recommended accessories

Drilling	Cleaning	Setting
<ul style="list-style-type: none"> <li>Suitable Rotary Hammer</li> <li>Properly sized drill bit</li> </ul>	<ul style="list-style-type: none"> <li>Manual blow-out pump</li> </ul>	<ul style="list-style-type: none"> <li>Torque wrench</li> <li>Hilti SIW 9-A22 Impact Wrench</li> </ul>



Coordinates Anchor [in.]

Anchor	x	y	c <sub>-x</sub>	c <sub>+x</sub>	c <sub>-y</sub>	c <sub>+y</sub>	Anchor	x	y	c <sub>-x</sub>	c <sub>+x</sub>	c <sub>-y</sub>	c <sub>+y</sub>
1	-7.500	-2.500	-	-	15.500	8.500	4	8.000	2.500	-	-	20.500	3.500
2	8.000	-2.500	-	-	15.500	8.500	5	-0.000	2.500	-	-	20.500	3.500
3	-7.500	2.500	-	-	20.500	3.500	6	-0.000	-2.500	-	-	15.500	8.500

Input data and results must be checked for conformity with the existing conditions and for plausibility!  
 PROFIS Engineering (c) 2003-2021 Hilti AG, FL-9494 Schaan Hilti is a registered Trademark of Hilti AG, Schaan



www.hilti.com

---

Company:		Page:	9
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	202001 - SPANDREL GRAVITY BRACKET	Date:	2/26/2021
Fastening point:			

---

## 8 Remarks; Your Cooperation Duties

- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.



**Drawings**

# CITY OF FAIRBANKS PARKING GARAGE REPAIRS FAIRBANKS, ALASKA

**GENERAL**  
G001 GENERAL INFORMATION

- STRUCTURAL**
- S001 STRUCTURAL GENERAL NOTES
  - S101 1ST FLOOR REPAIR PLAN
  - S102 2ND FLOOR REPAIR PLAN
  - S103 3RD FLOOR REPAIR PLAN
  - S104 4TH FLOOR REPAIR PLAN
  - S105 5TH FLOOR REPAIR PLAN
  - S201 PARKING GARAGE EXISTING CONDITIONS
  - S202 ADDITIVE ALTERNATES - PARKING GARAGE EXISTING CONDITIONS
  - S301 REPAIR DETAILS

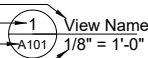



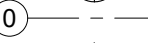
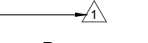
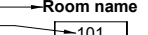
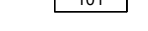
**PROJECT TEAM**

**OWNERS REPRESENTATIVE**  
CITY OF FAIRBANKS  
POINT OF CONTACT: TIMOTHY ZINZA  
800 CUSHMAN STREET, FAIRBANKS, AK 99701  
907 459-6745  
tzinza@ci.fairbanks.ak.us

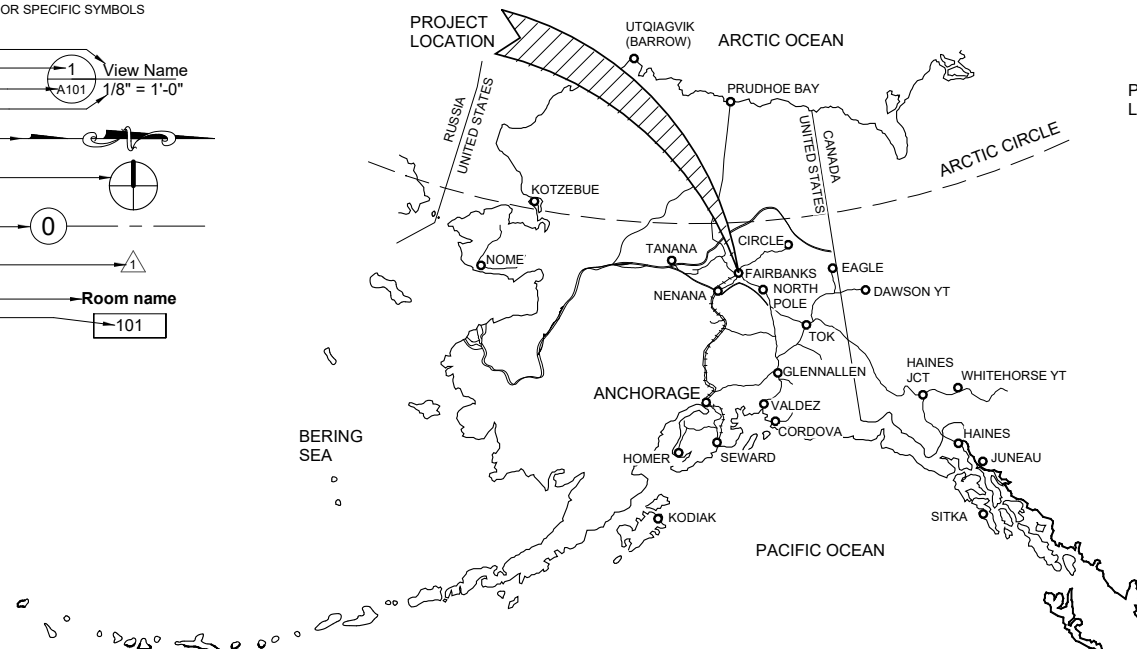
**DESIGNERS REPRESENTATIVE**  
DESIGN ALASKA  
POINT OF CONTACT: PATRICK BRANDON  
601 COLLEGE ROAD, FAIRBANKS, AK 99701  
907 452-1241  
patrickb@designalaska.com

**GENERAL SYMBOLS**

SEE DISCIPLINES FOR SPECIFIC SYMBOLS

- NAME \_\_\_\_\_
- NUMBER \_\_\_\_\_
- SHEET LOCATION  View Name
- SCALE  = 1'-0"
- TRUE NORTH 
- PLAN NORTH 
- GRID LINE 
- REVISION 
- ROOM NAME 
- ROOM NUMBER 

**ALASKA MAP**



**VICINITY MAP**



CITY OF  
FAIRBANKS  
PARKING GARAGE  
REPAIRS

ISSUE DATE 26 FEB 2021  
COMM. NUMBER 202001  
DESIGNED BY SMM  
DRAWN BY SMM  
SCALE 0" = 1"

GENERAL  
INFORMATION

**G001**

# GENERAL STRUCTURAL NOTES

## A. DESIGN CRITERIA

- |                               |  |
|-------------------------------|--|
| 1. BUILDING CODE .....        | 2015 IBC (INTERNATIONAL BUILDING CODE) |
| GOVERNING JURISDICTION .....  | CITY OF FAIRBANKS                      |
| 2. LIVE LOADS .....           |  |
| MINIMUM FLOOR LIVE LOAD ..... | 40 PSF                                 |
| VEHICLE BARRIER SYSTEM .....  | 6000 LB HORIZONTAL CONCENTRATED        |

## B. STRUCTURAL STEEL

- ANGLES, PLATES, AND CHANNELS SHALL BE ASTM A36 (Fy = 36 KSI).
- ALL STRUCTURAL STEEL SHALL BE DETAILED AND FABRICATED IN ACCORDANCE WITH THE LATEST EDITION OF THE AISC STEEL CONSTRUCTION MANUAL.
- BOLTED CONNECTIONS SHALL BE ACCOMPLISHED WITH HIGH-STRENGTH BOLTS CONFORMING TO ASTM A325 IN STANDARD HOLES UNLESS NOTED OTHERWISE.
- ALL BOLTED CONNECTIONS SHALL BE PRE-TENSIONED UNLESS NOTED OTHERWISE.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTROL OF ALL ERECTION PROCEDURES AND SEQUENCES WITH REGARD TO TEMPERATURE DIFFERENTIALS.
- WELDING SHALL BE PERFORMED WITH E70XX ELECTRODES. WELDING SHALL BE DONE BY QUALIFIED WELDERS AND SHALL CONFORM TO THE AWS D1.1 STRUCTURAL WELDING CODE-STEEL, LATEST EDITION. ALL WELDS ARE INTENDED TO BE CONTINUOUS UNLESS NOTED OTHERWISE.
- FIELD WELDS NOTED THROUGHOUT THE CONTRACT DOCUMENTS ARE ACCEPTABLE LOCATIONS FOR FIELD WELDING AT THE CONTRACTOR'S OPTION. FIELD WELDS MAY BE PERFORMED IN THE SHOP.

## C. POST-INSTALLED ANCHORS

POST-INSTALLED ANCHORS SHALL BE AS FOLLOWS, UNLESS NOTED OTHERWISE:

### CONCRETE

#### SCREW ANCHORS

- INTERIOR: HILTI KH-EZ OR SIMPSON TITEN HD
- EXTERIOR: SIMPSON TITEN HD, 316 STAINLESS

- INSTALL POST-INSTALLED ANCHORS ONLY AS INDICATED ON THE DRAWINGS OR WITH SPECIFIC WRITTEN APPROVAL OF THE ENGINEER PRIOR TO INSTALLATION.
- THE CONTRACTOR MAY NOT USE SUBSTITUTES FOR THE POST-INSTALLED ANCHORS WITHOUT PRIOR APPROVAL OF THE ENGINEER.
- SEE DRAWINGS FOR ANCHOR TYPE, SIZE, AND EMBEDMENT DEPTHS. INSTALL ANCHORS AS OUTLINED IN MANUFACTURER'S SPECIFICATIONS AND ICC REPORTS. UTILIZE PROPER DRILL TYPE, BIT SIZE, AND HOLE CLEANING, DRIVING OR TIGHTENING TECHNIQUES, UNLESS NOTED OTHERWISE.

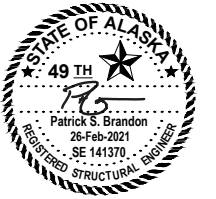
## D. MASONRY

- MASONRY MORTAR TO BE TYPE S, WITH A MINIMUM COMPRESSIVE STRENGTH PER ASTM C270.

## E. GENERAL

- CONTRACTOR IS TO FIELD VERIFY ALL DIMENSIONS AND ELEVATIONS TO MATCH NEW CONSTRUCTION TO EXISTING CONSTRUCTION.
- THE STRUCTURAL CONSTRUCTION DOCUMENTS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OR SEQUENCE OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AND PROVIDE ALL MEASURES NECESSARY TO PROTECT THE STRUCTURE DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO: BRACING, SHORING FOR LOADS DUE TO CONSTRUCTION EQUIPMENT, ETC. THE STRUCTURAL ENGINEER SHALL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S MEANS, METHODS, TECHNIQUES, SEQUENCES FOR PROCEDURE OF CONSTRUCTION, OR THE SAFETY PRECAUTIONS AND THE PROGRAMS INCIDENT THERETO (NOR SHALL OBSERVATION VISITS TO THE SITE INCLUDE INSPECTION OF THESE ITEMS.)
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND IMPLEMENTATION OF ALL SCAFFOLDING, BRACING AND SHORING.
- CONSTRUCTION MATERIALS SHALL BE SPREAD OUT IF PLACED ON FRAMED CONSTRUCTION. LOADS SHALL NOT EXCEED THE DESIGN LIVE LOAD.
- DO NOT USE SCALED DIMENSIONS TAKEN FROM STRUCTURAL DRAWINGS. CONTACT STRUCTURAL ENGINEER IF DIMENSIONAL INFORMATION IS MISSING.
- ANY ENGINEERING DESIGN PROVIDED BY OTHERS AND SUBMITTED FOR REVIEW SHALL BEAR THE SEAL OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF ALASKA.

SPECIAL INSPECTIONS					
THE FOLLOWING STRUCTURAL ITEMS REQUIRE SPECIAL INSPECTION PER IBC SECTIONS 1704-1707. SEE PROJECT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS FOR INSPECTION AND TESTING THAT ARE NOT PART OF SPECIAL INSPECTIONS.					
CONTINUOUS: SPECIAL INSPECTION BY THE SPECIAL INSPECTOR WHO IS PRESENT WHEN AND WHERE THE WORK TO BE INSPECTED IS BEING PERFORMED.					
PERIODIC: SPECIAL INSPECTION BY THE SPECIAL INSPECTOR WHO IS INTERMITTENTLY PRESENT WHERE THE WORK TO BE INSPECTED HAS BEEN OR IS BEING PERFORMED.					
SYSTEM or MATERIAL	IBC CODE REFERENCE	CODE or STANDARD REFERENCE	INSPECTION FREQUENCY		REMARKS
			CONTINUOUS	PERIODIC	
<b>DIVISION #03 - CONCRETE</b>					
<b>CONCRETE</b>					
INSPECT ANCHORS POST-INSTALLED IN HARDENED CONCRETE	TABLE 1705.3			X	SPECIAL INSPECTIONS APPLY TO ANCHOR PRODUCT NAME, TYPE, AND DIMENSIONS, HOLE DIMENSIONS, COMPLIANCE WITH DRILL BIT REQUIREMENTS, CLEANLINESS OF THE HOLE AND ANCHOR, ADHESIVE EXPIRATION DATE, ANCHOR/ADHESIVE INSTALLATION, ANCHOR EMBEDMENT, AND TIGHTENING TORQUE. INSPECTION FREQUENCY PER MANUFACTURER'S REQUIREMENTS BUT NOT LESS THAN 10% OF EACH ANCHOR, DOWEL, OR ADHESIVE TYPE
<b>DIVISION #05 - METALS</b>					
<b>FABRICATORS</b>					
FABRICATORS	1704.2.5 1704.2.5.1			X	SPECIAL INSPECTION IS REQUIRED FOR STRUCTURAL LOAD-BEARING MEMBERS AND ASSEMBLIES FABRICATED ON THE PREMISES OF A FABRICATOR'S SHOP  NOTE: SPECIAL INSPECTION IS NOT REQUIRED WHERE THE WORK IS DONE ON THE PREMISES OF A FABRICATOR REGISTERED AND APPROVED TO PERFORM SUCH WORK WITHOUT SPECIAL INSPECTION
<b>STEEL</b>					
SINGLE PASS FILLET WELDS LESS THAN OR EQUAL TO 5/16"	1705.2.1 TABLE 1705.3	AWS D1.1 AISC 360 J2.2		X	ALL WELDS VISUALLY INSPECTED PER AWS D1.1 6.9  EXCEPTION: SPECIAL INSPECTION OF RAILING SYSTEMS COMPOSED OF STRUCTURAL STEEL ELEMENTS SHALL BE LIMITED TO WELDING INSPECTION OF WELDS AT THE BASE OF CANTILEVERED RAIL POSTS (1705.2.1)



CITY OF  
FAIRBANKS  
PARKING GARAGE  
REPAIRS

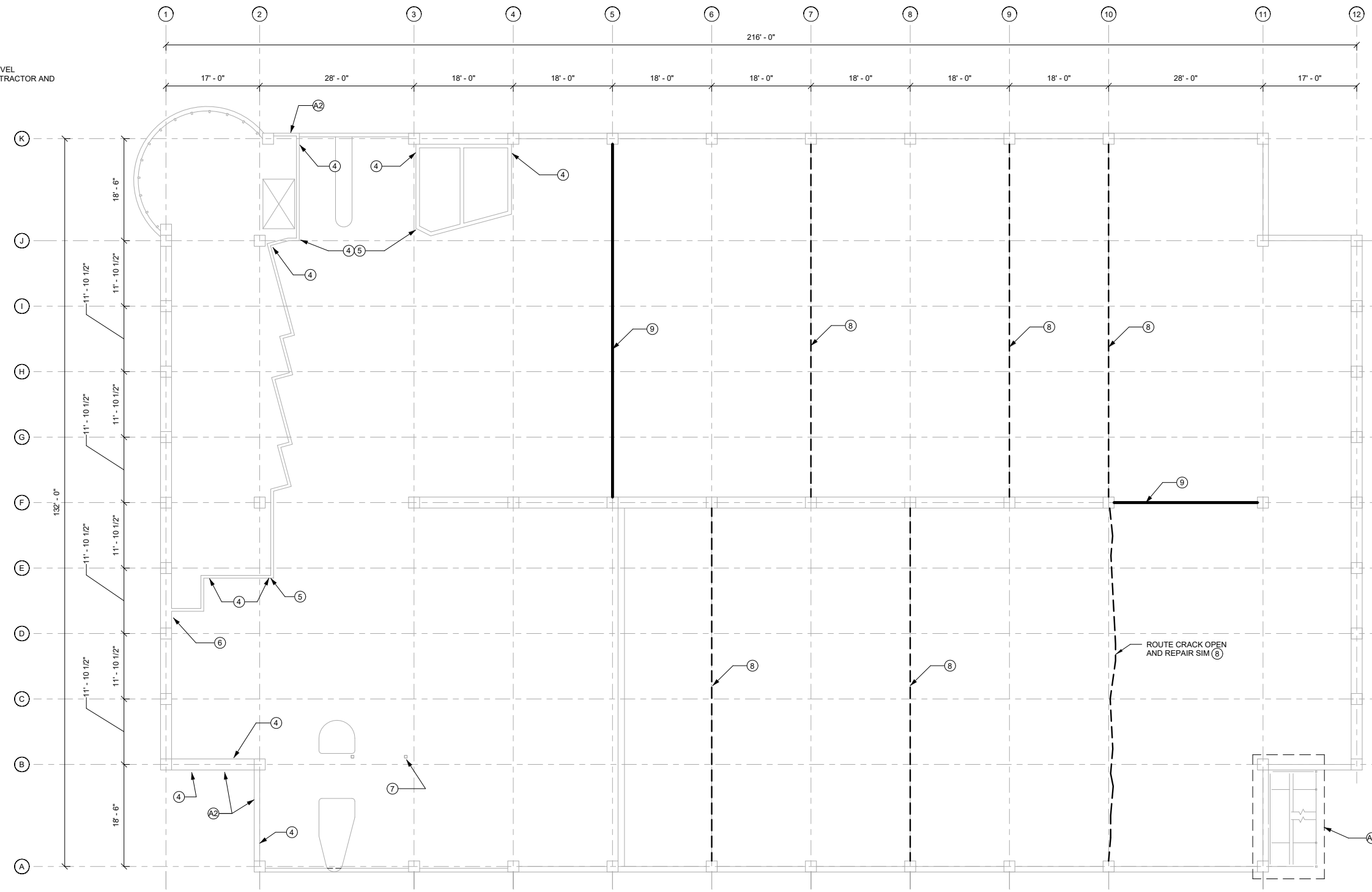
ISSUE DATE 26 FEB 2021  
COMM. NUMBER 202001  
DESIGNED BY SMM  
DRAWN BY SMM  
SCALE 0" = 1"

STRUCTURAL  
GENERAL NOTES

# S001

# GENERAL NOTES

1. NOT ALL KEYNOTES APPLY TO WORK ON EACH LEVEL
2. QUANTITIES OF REPAIRS TO BE VERIFIED BY CONTRACTOR AND COR PRIOR TO STARTING WORK



1 FOUNDATION/SLAB PLAN  
S101 3/32" = 1'-0"

# REPAIR PLAN KEYNOTES

**BASE BID:**

- ① REPAIR SPANDREL BEAM AND SURROUNDING SLAB PER 1 S301 3 S301  
PAINT NEW FABRICATIONS PER SPECIFICATION 07 92 00.
- ② APPLY WATERPROOF TRAFFIC RATED COATING TO SUSPENDED SLAB POUR STRIPS. REMOVE EXISTING ELASTOMERIC SEALANT AT JOINTS. PREPARE THE SURFACE AND THE JOINTS BETWEEN POST-TENSIONED SLAB AND POUR STRIP PER SPECIFICATION 07 18 16. COAT FULL LENGTH OF POUR STRIP AND 1'-0" BEYOND WIDTH OF POUR STRIP EITHER SIDE PER MANUFACTURER INSTRUCTIONS. RESTRIPE PARKING STALLS AND TRAFFIC PATTERN INDICATORS AFFECTED BY REPAIR. CLEAN RUST STAINING ON UNDERSIDE OF SLAB AT POUR STRIP JOINTS. BASIS OF DESIGN IS SIKALASTIC-720 ONE SHOT.
- ③ SEAL CRACKS ON THE TRAFFIC SURFACE OF THE SLAB WITH HIGH MODULUS, LOW VISCOSITY EPOXY CRACK INJECTION. PREPARE CRACK AND APPLY EPOXY PER MANUFACTURER INSTRUCTIONS. CLEAN RUST STAINING FROM THE UNDERSIDE OF THE SLAB. BASIS OF DESIGN IS SIKADUR-35 HI-MOD LV (CRACK REPAIR) AND SIKADUR-31 HI-MOD GEL (PORT AND CRACK SEALER). LENGTH OF CRACKS TO BE SEALED: 300 FT

- ④ REPAIR CRACKS IN FACE AND JOINTS OF INTERIOR CMU WALLS:  
A. REPOINT CRACKED MORTAR JOINTS PER 5 S301  
LENGTH OF JOINT TO BE REPOINTED: 80 FT  
B. CMU CRACK REPAIR  
1. HAIRLINE CRACKS LESS THAN 1/32" IN SPLIT FACE BLOCK AND BURNISHED CMU NEED NOT BE REPAIRED  
2. SPLIT FACE CMU CRACKING 1/32" TO 1/4": SIKAFLEX-15 LM  
3. BURNISHED CMU CRACKING  
A. NARROW (1/32" TO 1/16"): CLEAR POLYURETHANE SEALANT  
B. WIDE (1/16" TO 1/4"): SIKAFLEX-15 LM  
4. LF OF SPLIT FACE CRACKING: 45 FT  
LF OF NARROW BURNISHED CMU CRACKING: 10 FT  
LF OF WIDE BURNISHED CMU CRACKING: 5 FT

- ⑤ REINFORCE CMU AT CRACKED WALL CORNERS WITH HELICAL MASONRY TIE BENT TO MATCH CORNER ANGLE AND EMBEDDED INTO MORTAR JOINT PER 6 S301  
LENGTH OF MASONRY TIE REINFORCING: 45 FT
- ⑥ REMOVE BROKEN CMU FACE SHELL AND RECAST WITH COLOR MATCHED MORTAR
- ⑦ REMOVE SPALLED CONCRETE AROUND HSS CONNECTION TO SOUND MATERIAL. COAT PREPARED CONCRETE SURFACE AND EXISTING ANCHOR WITH BONDING PRIMER OR SCRUB COAT OF REPAIR MORTAR, AS REQUIRED BY MANUFACTURER. REPAIR CONCRETE WITH NON-EPOXY BASED REPAIR MORTAR. PRODUCTS USED SHALL BE RATED FOR OVERHEAD APPLICATIONS. APPLY PER MANUFACTURER'S INSTRUCTIONS. BASIS OF DESIGN IS SIKATOP-123 PLUS
- ⑧ REPAIR CONTROL JOINTS PER 4 S301  
TOTAL NUMBER OF DIAMOND-SHAPED SPALLS TO BE REPAIRED: 100 SPALLS  
TOTAL LENGTH OF CONTROL JOINTS TO BE REPAIRED: 330 FT
- ⑨ REPLACE (E) EXPANSION JOINT SEALANT WITH SIKAFLEX-1C SL OR APPROVED EQUAL, FULL LENGTH OF JOINT

**ALTERNATE #1:**

- Ⓐ1 RECOAT STAIRWELL, ENCLOSURE AT GROUND LEVEL, AND SUPPORTING COLUMNS AS FOLLOWS:  
A. STRIP FLAKING PAINT AND RECOAT ALL PAINTED STAIRWELL SURFACES PER SPECIFICATION 09 96 00.  
B. ABRABE CORRODED GALVANIZED CONNECTIONS AND COMPONENTS. RECOAT PER SPECIFICATION 09 96 00.

**ALTERNATE #2:**

- Ⓐ2 REPOINT CRACKED MORTAR JOINTS IN EXTERIOR CMU WALLS PER 5 S301  
LENGTH OF JOINT TO BE REPOINTED: 500 FT



**CITY OF FAIRBANKS  
PARKING GARAGE  
REPAIRS**

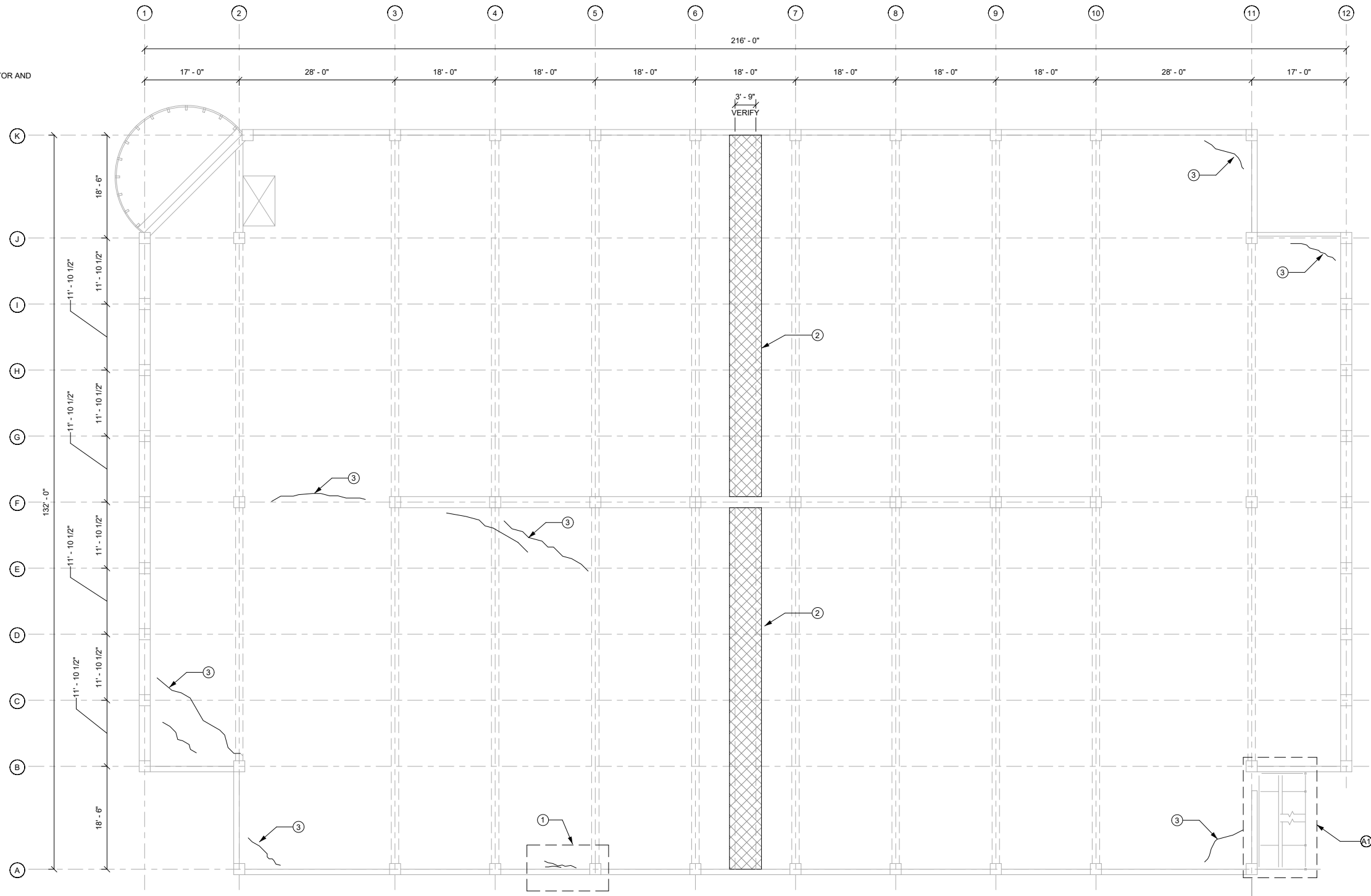
ISSUE DATE 26 FEB 2021  
COMM. NUMBER 202001  
DESIGNED BY SMM  
DRAWN BY SMM  
SCALE 0" = 1"

**1ST FLOOR  
REPAIR PLAN**

**S101**

# GENERAL NOTES

1. NOT ALL KEYNOTES APPLY TO WORK ON EACH LEVEL
2. QUANTITIES OF REPAIRS TO BE VERIFIED BY CONTRACTOR AND COR PRIOR TO STARTING WORK



1 2ND FLOOR REPAIR PLAN  
S102 3/32" = 1'-0"

## REPAIR PLAN KEYNOTES

### BASE BID:

- ① REPAIR SPANDREL BEAM AND SURROUNDING SLAB PER 1 S301 3 S301  
PAINT NEW FABRICATIONS PER SPECIFICATION 07 92 00.
- ② APPLY WATERPROOF TRAFFIC RATED COATING TO SUSPENDED SLAB POUR STRIPS. REMOVE EXISTING ELASTOMERIC SEALANT AT JOINTS. PREPARE THE SURFACE AND THE JOINTS BETWEEN POST-TENSIONED SLAB AND POUR STRIP PER SPECIFICATION 07 18 16. COAT FULL LENGTH OF POUR STRIP AND 1'-0" BEYOND WIDTH OF POUR STRIP EITHER SIDE PER MANUFACTURER INSTRUCTIONS. RESTRIPE PARKING STALLS AND TRAFFIC PATTERN INDICATORS AFFECTED BY REPAIR. CLEAN RUST STAINING ON UNDERSIDE OF SLAB AT POUR STRIP JOINTS. BASIS OF DESIGN IS SIKALASTIC-720 ONE SHOT.
- ③ SEAL CRACKS ON THE TRAFFIC SURFACE OF THE SLAB WITH HIGH MODULUS, LOW VISCOSITY EPOXY CRACK INJECTION. PREPARE CRACK AND APPLY EPOXY PER MANUFACTURER INSTRUCTIONS. CLEAN RUST STAINING FROM THE UNDERSIDE OF THE SLAB. BASIS OF DESIGN IS SIKADUR-35 HI-MOD LV (CRACK REPAIR) AND SIKADUR-31 HI-MOD GEL (PORT AND CRACK SEALER). LENGTH OF CRACKS TO BE SEALED: 300 FT

- ④ REPAIR CRACKS IN FACE AND JOINTS OF INTERIOR CMU WALLS:  
A. REPOINT CRACKED MORTAR JOINTS PER 5 S301  
LENGTH OF JOINT TO BE REPOINTED: 80 FT  
B. CMU CRACK REPAIR  
1. HAIRLINE CRACKS LESS THAN 1/32" IN SPLIT FACE BLOCK AND BURNISHED CMU NEED NOT BE REPAIRED  
2. SPLIT FACE CMU CRACKING 1/32" TO 1/4": SIKAFLEX-15 LM  
3. BURNISHED CMU CRACKING  
A. NARROW (1/32" TO 1/16"): CLEAR POLYURETHANE SEALANT  
B. WIDE (1/16" TO 1/4"): SIKAFLEX-15 LM  
4. LF OF SPLIT FACE CRACKING: 45 FT  
LF OF NARROW BURNISHED CMU CRACKING: 10 FT  
LF OF WIDE BURNISHED CMU CRACKING: 5 FT

- ⑤ REINFORCE CMU AT CRACKED WALL CORNERS WITH HELICAL MASONRY TIE BENT TO MATCH CORNER ANGLE AND EMBEDDED INTO MORTAR JOINT PER 6 S301  
LENGTH OF MASONRY TIE REINFORCING: 45 FT
- ⑥ REMOVE BROKEN CMU FACE SHELL AND RECAST WITH COLOR MATCHED MORTAR
- ⑦ REMOVE SPALLED CONCRETE AROUND HSS CONNECTION TO SOUND MATERIAL. COAT PREPARED CONCRETE SURFACE AND EXISTING ANCHOR WITH BONDING PRIMER OR SCRUB COAT OF REPAIR MORTAR, AS REQUIRED BY MANUFACTURER. REPAIR CONCRETE WITH NON-EPOXY BASED REPAIR MORTAR. PRODUCTS USED SHALL BE RATED FOR OVERHEAD APPLICATIONS. APPLY PER MANUFACTURER'S INSTRUCTIONS. BASIS OF DESIGN IS SIKATOP-123 PLUS
- ⑧ REPAIR CONTROL JOINTS PER 4 S301  
TOTAL NUMBER OF DIAMOND-SHAPED SPALLS TO BE REPAIRED: 100 SPALLS  
TOTAL LENGTH OF CONTROL JOINTS TO BE REPAIRED: 330 FT
- ⑨ REPLACE (E) EXPANSION JOINT SEALANT WITH SIKAFLEX-1C SL OR APPROVED EQUAL. FULL LENGTH OF JOINT

### ALTERNATE #1:

- ① RECOAT STAIRWELL, ENCLOSURE AT GROUND LEVEL, AND SUPPORTING COLUMNS AS FOLLOWS:  
A. STRIP FLAKING PAINT AND RECOAT ALL PAINTED STAIRWELL SURFACES PER SPECIFICATION 09 96 00.  
B. ABRASE CORRODED GALVANIZED CONNECTIONS AND COMPONENTS. RECOAT PER SPECIFICATION 09 96 00.

### ALTERNATE #2:

- ② REPOINT CRACKED MORTAR JOINTS IN EXTERIOR CMU WALLS PER 5 S301  
LENGTH OF JOINT TO BE REPOINTED: 500 FT



## CITY OF FAIRBANKS PARKING GARAGE REPAIRS

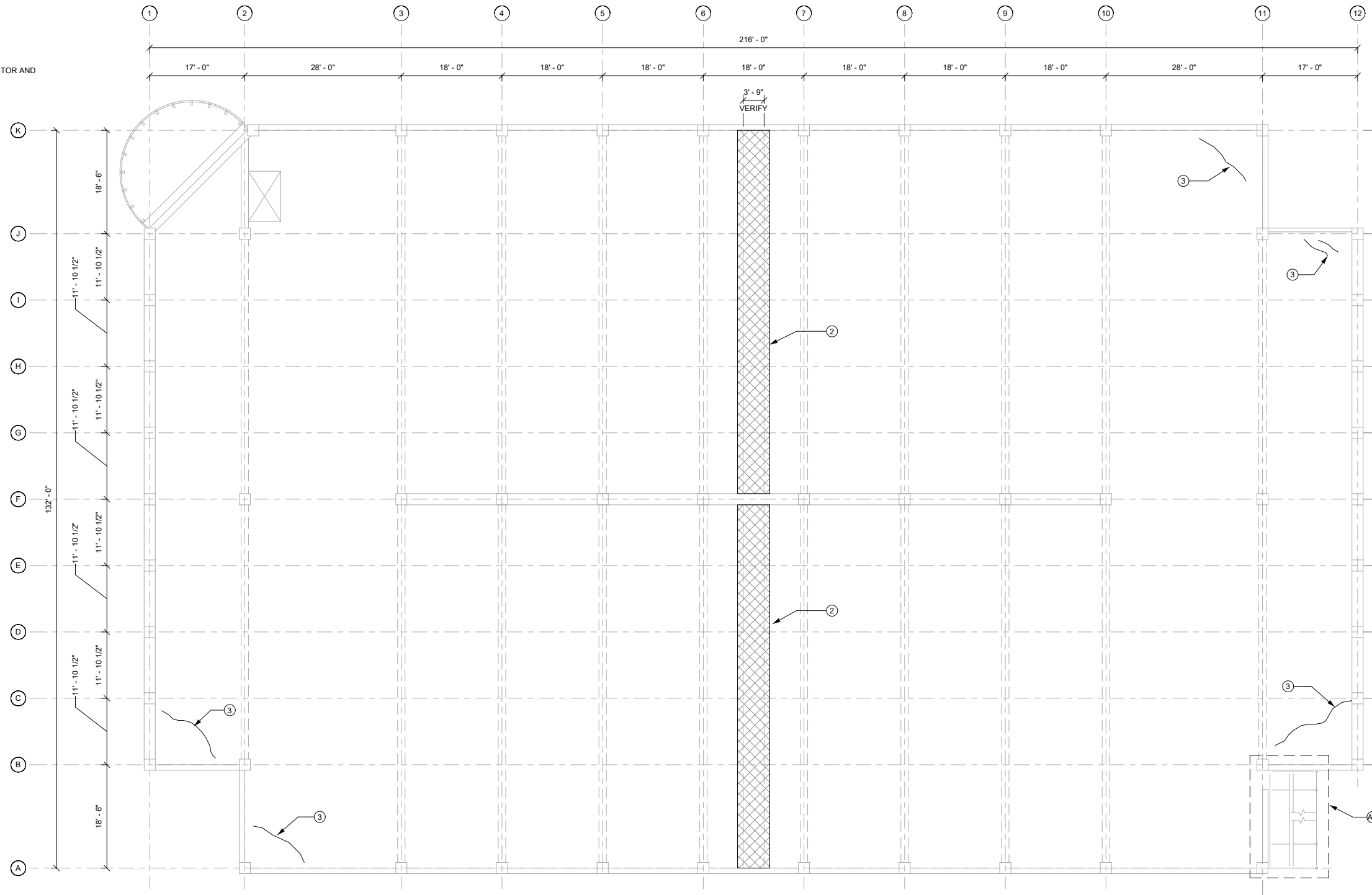
ISSUE DATE 26 FEB 2021  
COMM. NUMBER 202001  
DESIGNED BY SMM  
DRAWN BY SMM  
SCALE 0" = 1"

## 2ND FLOOR REPAIR PLAN

# S102

# GENERAL NOTES

1. NOT ALL KEYNOTES APPLY TO WORK ON EACH LEVEL
2. QUANTITIES OF REPAIRS TO BE VERIFIED BY CONTRACTOR AND COR PRIOR TO STARTING WORK



1 3RD FLOOR REPAIR PLAN  
S103 3/32" = 1'-0"

## REPAIR PLAN KEYNOTES

**BASE BID:**

- ① REPAIR SPANDREL BEAM AND SURROUNDING SLAB PER 1 3  
S301 S301  
PAINT NEW FABRICATIONS PER SPECIFICATION 07 92 00.
- ② APPLY WATERPROOF TRAFFIC RATED COATING TO SUSPENDED SLAB POUR STRIPS. REMOVE EXISTING ELASTOMERIC SEALANT AT JOINTS. PREPARE THE SURFACE AND THE JOINTS BETWEEN POST-TENSIONED SLAB AND POUR STRIP PER SPECIFICATION 07 18 16. COAT FULL LENGTH OF POUR STRIP AND 1'-0" BEYOND WIDTH OF POUR STRIP EITHER SIDE PER MANUFACTURER INSTRUCTIONS. RESTRIPE PARKING STALLS AND TRAFFIC PATTERN INDICATORS AFFECTED BY REPAIR. CLEAN RUST STAINING ON UNDERSIDE OF SLAB AT POUR STRIP JOINTS. BASIS OF DESIGN IS SIKALASTIC-720 ONE SHOT.
- ③ SEAL CRACKS ON THE TRAFFIC SURFACE OF THE SLAB WITH HIGH MODULUS, LOW VISCOSITY EPOXY CRACK INJECTION. PREPARE CRACK AND APPLY EPOXY PER MANUFACTURER INSTRUCTIONS. CLEAN RUST STAINING FROM THE UNDERSIDE OF THE SLAB. BASIS OF DESIGN IS SIKADUR-35 HI-MOD LV (CRACK REPAIR) AND SIKADUR-31 HI-MOD GEL (PORT AND CRACK SEALER). LENGTH OF CRACKS TO BE SEALED: 300 FT

- ④ REPAIR CRACKS IN FACE AND JOINTS OF INTERIOR CMU WALLS:  
A. REPOINT CRACKED MORTAR JOINTS PER 5  
S301

LENGTH OF JOINT TO BE REPOINTED: 80 FT

- B. CMU CRACK REPAIR
  1. HAIRLINE CRACKS LESS THAN 1/32" IN SPLIT FACE BLOCK AND BURNISHED CMU NEED NOT BE REPAIRED
  2. SPLIT FACE CMU CRACKING 1/32" TO 1/4": SIKAFLEX-15 LM
  3. BURNISHED CMU CRACKING
    - A. NARROW (1/32" TO 1/16"): CLEAR POLYURETHANE SEALANT
    - B. WIDE (1/16" TO 1/4"): SIKAFLEX-15 LM
  4. LF OF SPLIT FACE CRACKING: 45 FT  
LF OF NARROW BURNISHED CMU CRACKING: 10 FT  
LF OF WIDE BURNISHED CMU CRACKING: 5 FT

- ⑤ REINFORCE CMU AT CRACKED WALL CORNERS WITH HELICAL MASONRY TIE BENT TO MATCH CORNER ANGLE AND EMBEDDED INTO MORTAR JOINT PER 6  
S301

LENGTH OF MASONRY TIE REINFORCING: 45 FT

- ⑥ REMOVE BROKEN CMU FACE SHELL AND RECAST WITH COLOR MATCHED MORTAR
  - ⑦ REMOVE SPALLED CONCRETE AROUND HSS CONNECTION TO SOUND MATERIAL. COAT PREPARED CONCRETE SURFACE AND EXISTING ANCHOR WITH BONDING PRIMER OR SCRUB COAT OF REPAIR MORTAR, AS REQUIRED BY MANUFACTURER. REPAIR CONCRETE WITH NON-EPOXY BASED REPAIR MORTAR. PRODUCTS USED SHALL BE RATED FOR OVERHEAD APPLICATIONS. APPLY PER MANUFACTURER'S INSTRUCTIONS. BASIS OF DESIGN IS SIKATOP-123 PLUS
  - ⑧ REPAIR CONTROL JOINTS PER 4  
S301
- TOTAL NUMBER OF DIAMOND-SHAPED SPALLS TO BE REPAIRED: 100 SPALLS  
TOTAL LENGTH OF CONTROL JOINTS TO BE REPAIRED: 330 FT
- ⑨ REPLACE (E) EXPANSION JOINT SEALANT WITH SIKAFLEX-1C SL OR APPROVED EQUAL, FULL LENGTH OF JOINT

**ALTERNATE #1:**

- ① RECOAT STAIRWELL ENCLOSURE AT GROUND LEVEL, AND SUPPORTING COLUMNS AS FOLLOWS:
  - A. STRIP FLAKING PAINT AND RECOAT ALL PAINTED STAIRWELL SURFACES PER SPECIFICATION 09 96 00.
  - B. ABRABE CORRODED GALVANIZED CONNECTIONS AND COMPONENTS. RECOAT PER SPECIFICATION 09 96 00.

**ALTERNATE #2:**

- ② REPOINT CRACKED MORTAR JOINTS IN EXTERIOR CMU WALLS PER 5  
S301
- LENGTH OF JOINT TO BE REPOINTED: 500 FT



**CITY OF FAIRBANKS  
PARKING GARAGE  
REPAIRS**

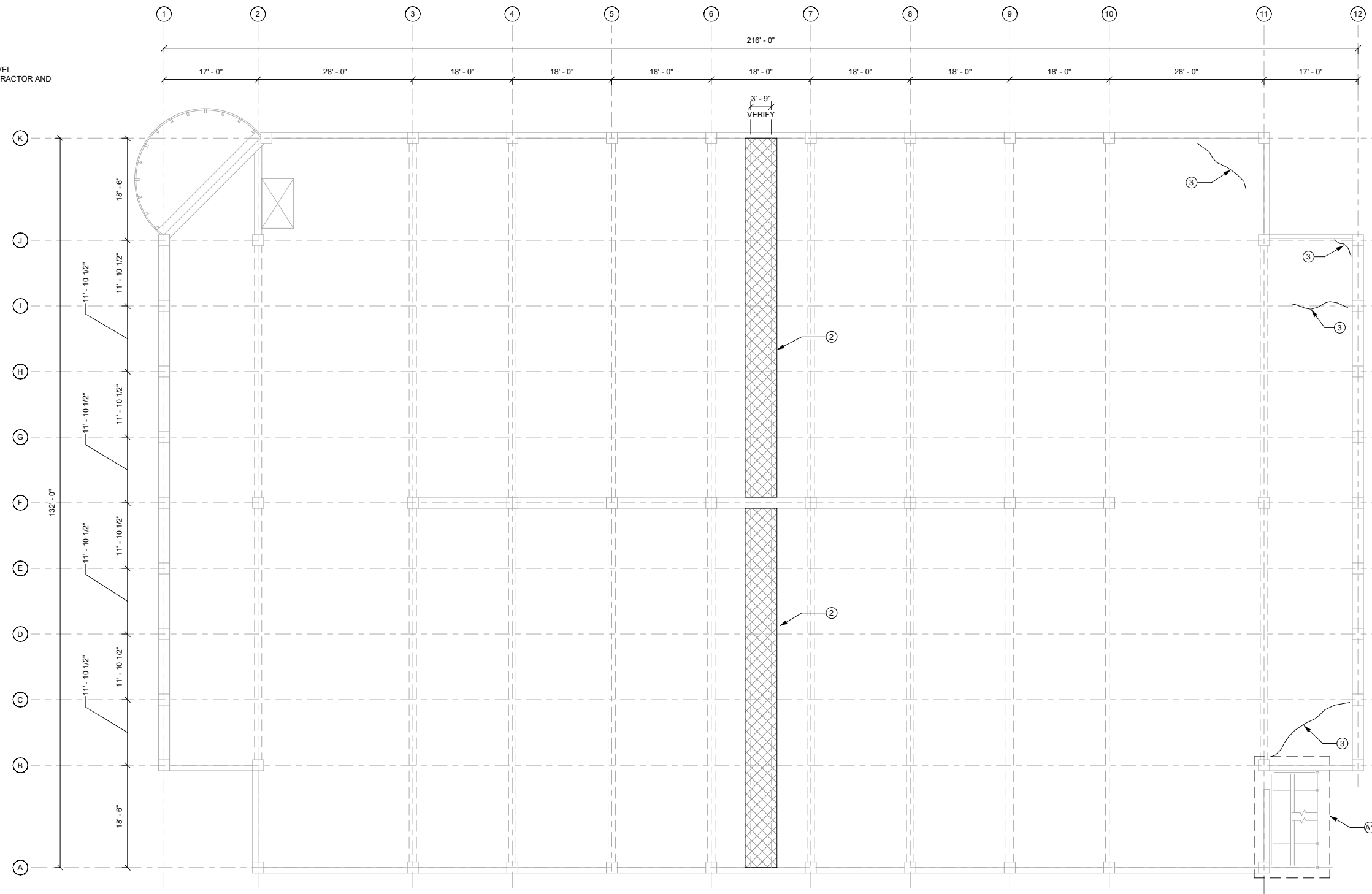
ISSUE DATE 26 FEB 2021  
COMM. NUMBER 202001  
DESIGNED BY SMM  
DRAWN BY SMM  
SCALE 0" = 1"

**3RD FLOOR  
REPAIR PLAN**

**S103**

# GENERAL NOTES

1. NOT ALL KEYNOTES APPLY TO WORK ON EACH LEVEL
2. QUANTITIES OF REPAIRS TO BE VERIFIED BY CONTRACTOR AND COR PRIOR TO STARTING WORK



1 4TH FLOOR REPAIR PLAN  
S104 3/32" = 1'-0"

## REPAIR PLAN KEYNOTES

### BASE BID:

1. REPAIR SPANDREL BEAM AND SURROUNDING SLAB PER  $\frac{1}{S301}$   $\frac{3}{S301}$ .  
PAINT NEW FABRICATIONS PER SPECIFICATION 07 92 00.
2. APPLY WATERPROOF TRAFFIC RATED COATING TO SUSPENDED SLAB POUR STRIPS. REMOVE EXISTING ELASTOMERIC SEALANT AT JOINTS. PREPARE THE SURFACE AND THE JOINTS BETWEEN POST-TENSIONED SLAB AND POUR STRIP PER SPECIFICATION 07 18 16. COAT FULL LENGTH OF POUR STRIP AND 1'-0" BEYOND WIDTH OF POUR STRIP EITHER SIDE PER MANUFACTURER INSTRUCTIONS. RESTRIPE PARKING STALLS AND TRAFFIC PATTERN INDICATORS AFFECTED BY REPAIR. CLEAN RUST STAINING ON UNDERSIDE OF SLAB AT POUR STRIP JOINTS. BASIS OF DESIGN IS SIKALASTIC-720 ONE SHOT.
3. SEAL CRACKS ON THE TRAFFIC SURFACE OF THE SLAB WITH HIGH MODULUS, LOW VISCOSITY EPOXY CRACK INJECTION. PREPARE CRACK AND APPLY EPOXY PER MANUFACTURER INSTRUCTIONS. CLEAN RUST STAINING FROM THE UNDERSIDE OF THE SLAB. BASIS OF DESIGN IS SIKADUR-35 HI-MOD LV (CRACK REPAIR) AND SIKADUR-31 HI-MOD GEL (PORT AND CRACK SEALER). LENGTH OF CRACKS TO BE SEALED: 300 FT

4. REPAIR CRACKS IN FACE AND JOINTS OF INTERIOR CMU WALLS:  
A. REPOINT CRACKED MORTAR JOINTS PER  $\frac{5}{S301}$

LENGTH OF JOINT TO BE REPOINTED: 80 FT

- CMU CRACK REPAIR
  1. HAIRLINE CRACKS LESS THAN 1/32" IN SPLIT FACE BLOCK AND BURNISHED CMU NEED NOT BE REPAIRED
  2. SPLIT FACE CMU CRACKING 1/32" TO 1/4": SIKAFLEX-15 LM
  3. BURNISHED CMU CRACKING
    - A. NARROW (1/32" TO 1/16"): CLEAR POLYURETHANE SEALANT
    - B. WIDE (1/16" TO 1/4"): SIKAFLEX-15 LM
  4. LF OF SPLIT FACE CRACKING: 45 FT  
LF OF NARROW BURNISHED CMU CRACKING: 10 FT  
LF OF WIDE BURNISHED CMU CRACKING: 5 FT

5. REINFORCE CMU AT CRACKED WALL CORNERS WITH HELICAL MASONRY TIE BENT TO MATCH CORNER ANGLE AND EMBEDDED INTO MORTAR JOINT PER  $\frac{6}{S301}$   
LENGTH OF MASONRY TIE REINFORCING: 45 FT

6. REMOVE BROKEN CMU FACE SHELL AND RECAST WITH COLOR MATCHED MORTAR

7. REMOVE SPALLED CONCRETE AROUND HSS CONNECTION TO SOUND MATERIAL. COAT PREPARED CONCRETE SURFACE AND EXISTING ANCHOR WITH BONDING PRIMER OR SCRUB COAT OF REPAIR MORTAR, AS REQUIRED BY MANUFACTURER. REPAIR CONCRETE WITH NON-EPOXY BASED REPAIR MORTAR. PRODUCTS USED SHALL BE RATED FOR OVERHEAD APPLICATIONS. APPLY PER MANUFACTURER'S INSTRUCTIONS. BASIS OF DESIGN IS SIKATOP-123 PLUS

8. REPAIR CONTROL JOINTS PER  $\frac{4}{S301}$

TOTAL NUMBER OF DIAMOND-SHAPED SPALLS TO BE REPAIRED: 100 SPALLS  
TOTAL LENGTH OF CONTROL JOINTS TO BE REPAIRED: 330 FT

9. REPLACE (E) EXPANSION JOINT SEALANT WITH SIKAFLEX-1C SL OR APPROVED EQUAL. FULL LENGTH OF JOINT

### ALTERNATE #1:

- A1. RECOAT STAIRWELL, ENCLOSURE AT GROUND LEVEL, AND SUPPORTING COLUMNS AS FOLLOWS:
  - A. STRIP FLAKING PAINT AND RECOAT ALL PAINTED STAIRWELL SURFACES PER SPECIFICATION 09 96 00.
  - B. ABRASE CORRODED GALVANIZED CONNECTIONS AND COMPONENTS. RECOAT PER SPECIFICATION 09 96 00.

### ALTERNATE #2:

- A2. REPOINT CRACKED MORTAR JOINTS IN EXTERIOR CMU WALLS PER  $\frac{5}{S301}$   
LENGTH OF JOINT TO BE REPOINTED: 500 FT



## CITY OF FAIRBANKS PARKING GARAGE REPAIRS

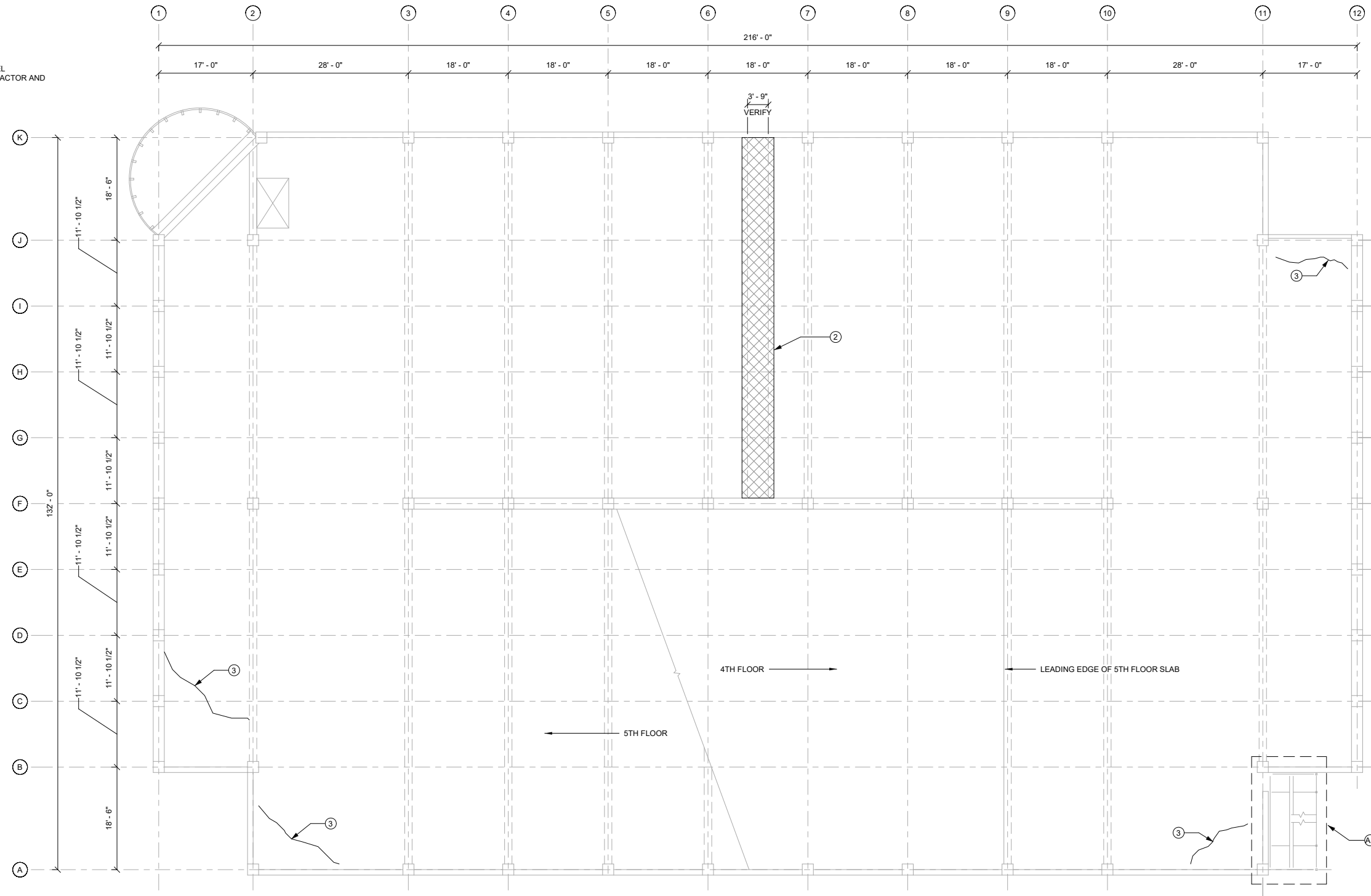
ISSUE DATE 26 FEB 2021  
COMM. NUMBER 202001  
DESIGNED BY SMM  
DRAWN BY SMM  
SCALE 0" = 1"

## 4TH FLOOR REPAIR PLAN

# S104

# GENERAL NOTES

1. NOT ALL KEYNOTES APPLY TO WORK ON EACH LEVEL
2. QUANTITIES OF REPAIRS TO BE VERIFIED BY CONTRACTOR AND COR PRIOR TO STARTING WORK



1 5TH FLOOR REPAIR PLAN  
S105 3/32" = 1'-0"

## REPAIR PLAN KEYNOTES

### BASE BID:

1. REPAIR SPANDREL BEAM AND SURROUNDING SLAB PER  $\frac{1}{S301}$   $\frac{3}{S301}$ . PAINT NEW FABRICATIONS PER SPECIFICATION 07 92 00.
2. APPLY WATERPROOF TRAFFIC RATED COATING TO SUSPENDED SLAB POUR STRIPS. REMOVE EXISTING ELASTOMERIC SEALANT AT JOINTS. PREPARE THE SURFACE AND THE JOINTS BETWEEN POST-TENSIONED SLAB AND POUR STRIP PER SPECIFICATION 07 18 16. COAT FULL LENGTH OF POUR STRIP AND 1'-0" BEYOND WIDTH OF POUR STRIP EITHER SIDE PER MANUFACTURER INSTRUCTIONS. RESTRIPE PARKING STALLS AND TRAFFIC PATTERN INDICATORS AFFECTED BY REPAIR. CLEAN RUST STAINING ON UNDERSIDE OF SLAB AT POUR STRIP JOINTS. BASIS OF DESIGN IS SIKALASTIC-720 ONE SHOT.
3. SEAL CRACKS ON THE TRAFFIC SURFACE OF THE SLAB WITH HIGH MODULUS, LOW VISCOSITY EPOXY CRACK INJECTION. PREPARE CRACK AND APPLY EPOXY PER MANUFACTURER INSTRUCTIONS. CLEAN RUST STAINING FROM THE UNDERSIDE OF THE SLAB. BASIS OF DESIGN IS SIKADUR-35 HI-MOD LV (CRACK REPAIR) AND SIKADUR-31 HI-MOD GEL (PORT AND CRACK SEALER). LENGTH OF CRACKS TO BE SEALED: 300 FT

4. REPAIR CRACKS IN FACE AND JOINTS OF INTERIOR CMU WALLS:  
A. REPOINT CRACKED MORTAR JOINTS PER  $\frac{5}{S301}$

LENGTH OF JOINT TO BE REPOINTED: 80 FT

- CMU CRACK REPAIR
  1. HAIRLINE CRACKS LESS THAN 1/32" IN SPLIT FACE BLOCK AND BURNISHED CMU NEED NOT BE REPAIRED
  2. SPLIT FACE CMU CRACKING 1/32" TO 1/4": SIKAFLEX-15 LM
  3. BURNISHED CMU CRACKING
    - A. NARROW (1/32" TO 1/16"): CLEAR POLYURETHANE SEALANT
    - B. WIDE (1/16" TO 1/4"): SIKAFLEX-15 LM
  4. LF OF SPLIT FACE CRACKING: 45 FT  
LF OF NARROW BURNISHED CMU CRACKING: 10 FT  
LF OF WIDE BURNISHED CMU CRACKING: 5 FT

5. REINFORCE CMU AT CRACKED WALL CORNERS WITH HELICAL MASONRY TIE BENT TO MATCH CORNER ANGLE AND EMBEDDED INTO MORTAR JOINT PER  $\frac{6}{S301}$

LENGTH OF MASONRY TIE REINFORCING: 45 FT

6. REMOVE BROKEN CMU FACE SHELL AND RECAST WITH COLOR MATCHED MORTAR
  7. REMOVE SPALLED CONCRETE AROUND HSS CONNECTION TO SOUND MATERIAL. COAT PREPARED CONCRETE SURFACE AND EXISTING ANCHOR WITH BONDING PRIMER OR SCRUB COAT OF REPAIR MORTAR, AS REQUIRED BY MANUFACTURER. REPAIR CONCRETE WITH NON-EPOXY BASED REPAIR MORTAR. PRODUCTS USED SHALL BE RATED FOR OVERHEAD APPLICATIONS. APPLY PER MANUFACTURER'S INSTRUCTIONS. BASIS OF DESIGN IS SIKATOP-123 PLUS
  8. REPAIR CONTROL JOINTS PER  $\frac{4}{S301}$
- TOTAL NUMBER OF DIAMOND-SHAPED SPALLS TO BE REPAIRED: 100 SPALLS  
TOTAL LENGTH OF CONTROL JOINTS TO BE REPAIRED: 330 FT
9. REPLACE (E) EXPANSION JOINT SEALANT WITH SIKAFLEX-1C SL OR APPROVED EQUAL, FULL LENGTH OF JOINT

### ALTERNATE #1:

- RECOAT STAIRWELL, ENCLOSURE AT GROUND LEVEL, AND SUPPORTING COLUMNS AS FOLLOWS:
  - A. STRIP FLAKING PAINT AND RECOAT ALL PAINTED STAIRWELL SURFACES PER SPECIFICATION 09 96 00.
  - B. ABRASE CORRODED GALVANIZED CONNECTIONS AND COMPONENTS. RECOAT PER SPECIFICATION 09 96 00.

### ALTERNATE #2:

- REPOINT CRACKED MORTAR JOINTS IN EXTERIOR CMU WALLS PER  $\frac{5}{S301}$
- LENGTH OF JOINT TO BE REPOINTED: 500 FT



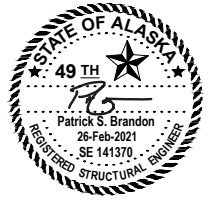
## CITY OF FAIRBANKS PARKING GARAGE REPAIRS

ISSUE DATE 26 FEB 2021  
COMM. NUMBER 202001  
DESIGNED BY SMM  
DRAWN BY SMM  
SCALE 0" = 1"

## 5TH FLOOR REPAIR PLAN

S105





1.A REPAIR 1 - SPANDREL BEAM CRACKING (ABOVE)  
S201 1" = 1'-0"



1.B REPAIR 1 - SPANDREL BEAM CRACKING (BELOW)  
S201 1" = 1'-0"



1.C REPAIR 1 - VEHICLE BARRIER  
S201 1" = 1'-0"



2 REPAIR 2 - POUR STRIP SEALING  
S201 1" = 1'-0"



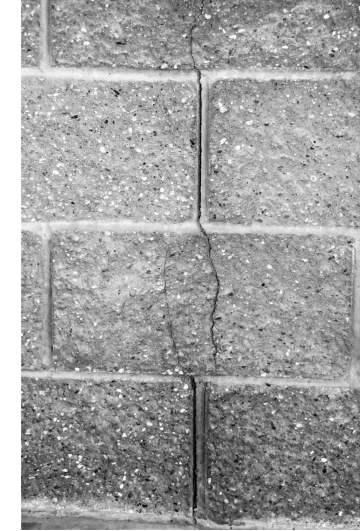
3.A REPAIR 3 - POST TENSIONED SLAB CRACKING  
S201 1" = 1'-0"



3.B REPAIR 3 - POST TENSION SLAB CRACKING (TOP)  
S201 1" = 1'-0"



4.A REPAIR 4 - CMU CRACKING (FACE)  
S201 1" = 1'-0"



4.B REPAIR 4 - CMU CRACKING (JOINT AND FACE)  
S201 1" = 1'-0"

## CITY OF FAIRBANKS PARKING GARAGE REPAIRS

ISSUE DATE 26 FEB 2021  
COMM. NUMBER 202001  
DESIGNED BY SMM  
DRAWN BY SMM  
SCALE 0" = 1"

## PARKING GARAGE EXISTING CONDITIONS



5 REPAIR 5 - CMU CRACKING (CORNER)  
S201 1" = 1'-0"



6 REPAIR 6 - CRACKED CMU FACE SHELL  
S201 1" = 1'-0"



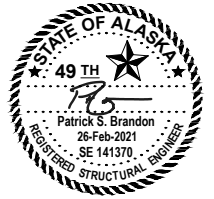
7 REPAIR 7 - SPALLING AT HSS ANCHOR  
S201 1" = 1'-0"



8 REPAIR 8 - DIAMOND SPALLING OF SLAB  
S201 1" = 1'-0"

# S201





**A1.A**  
S202 ALTERNATE #1 - REPAIR A1 EXTERIOR OF STAIRWELL  
1" = 1'-0"



**A1.B**  
S202 ALTERNATE #1 - REPAIR A1 - STAIR CORROSION  
1" = 1'-0"



**A1.C**  
S202 ALTERNATE #1 - REPAIR A1 - LANDING CORROSION  
1" = 1'-0"



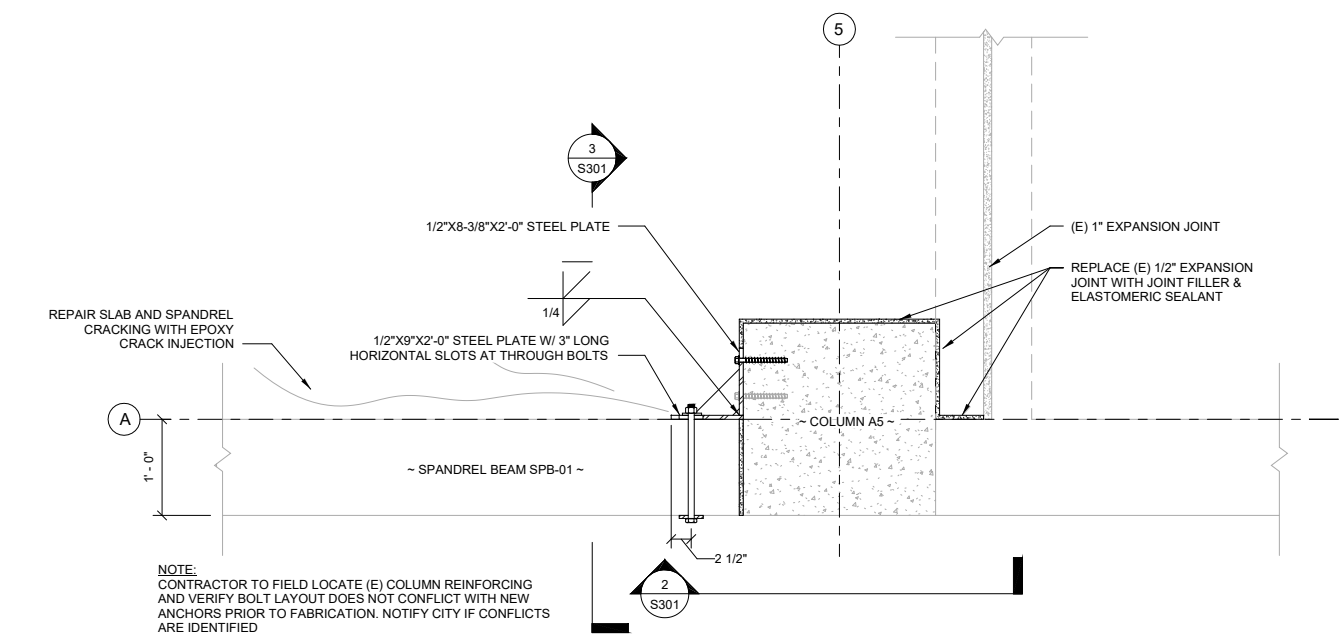
**A2**  
S202 ALTERNATE #2 - REPAIR A2 - CRACKED MORTAR JOINTS AT EXTERIOR CMU FACE  
1" = 1'-0"

CITY OF  
FAIRBANKS  
PARKING GARAGE  
REPAIRS

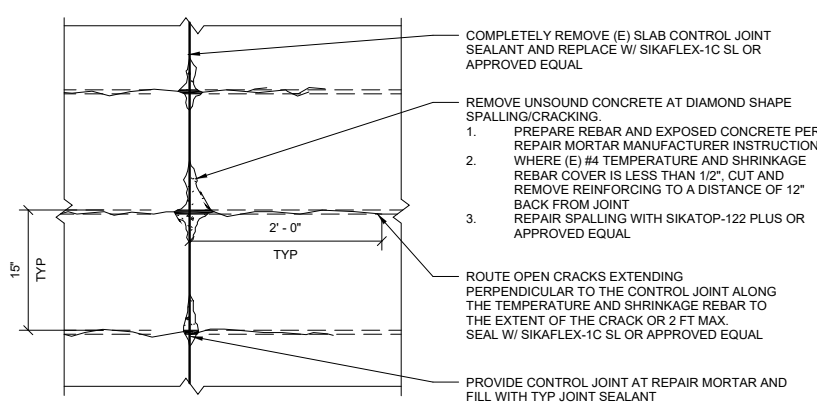
ISSUE DATE 26 FEB 2021  
COMM. NUMBER 202001  
DESIGNED BY SMM  
DRAWN BY SMM  
SCALE 0" = 1"

ADDITIVE  
ALTERNATES -  
PARKING GARAGE  
EXISTING  
CONDITIONS

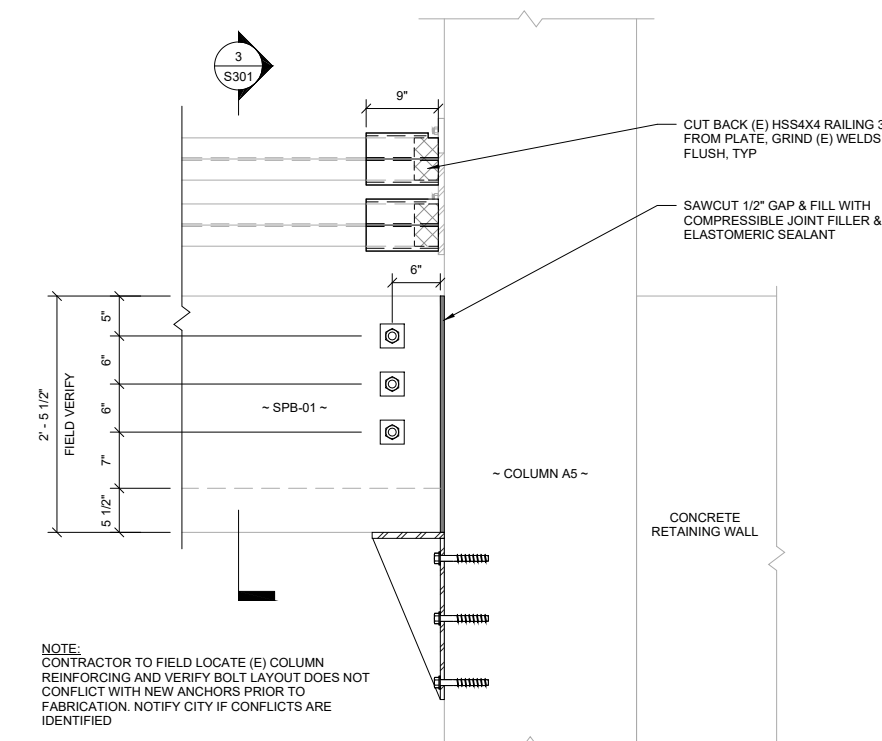
**S202**



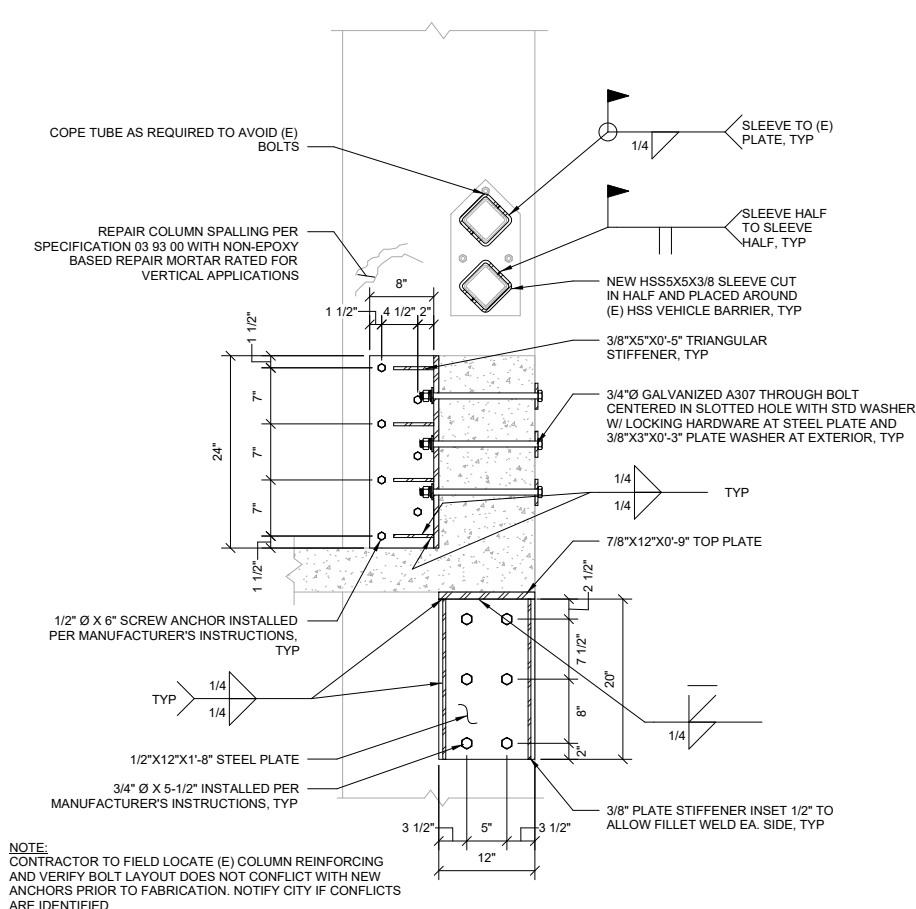
**1 SPANDREL REPAIR AT A-5**  
S301 1" = 1'-0"



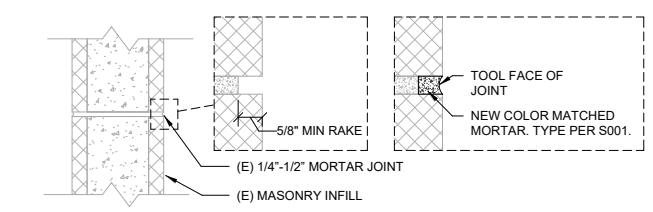
**4 CONTROL JOINT REPAIR**  
S301 1" = 1'-0"



**2 SPANDREL REPAIR - ELEVATION**  
S301 1" = 1'-0"

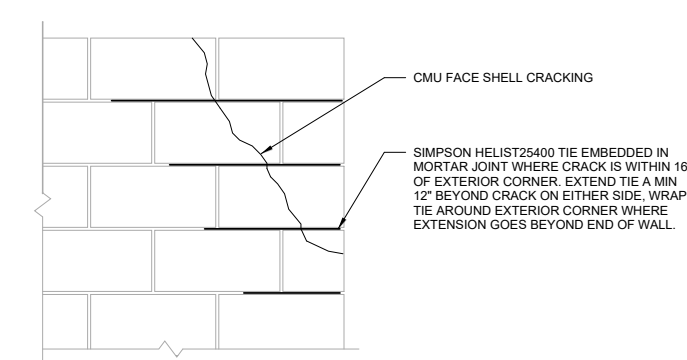


**3 SPANDREL REPAIR - SECTION**  
S301 1" = 1'-0"



- NOTES:**
- RAKE OUT EXISTING MORTAR USING NON-IMPACT TOOLS ONLY. WASH AND DAMPEN JOINTS PRIOR TO PLACING MORTAR.
  - MASONRY BED JOINT SHOWN. VERTICAL JOINTS ARE SIMILAR

**5 MASONRY REPOINTING**  
S301 1 1/2" = 1'-0"



**6 MASONRY JOINT REINFORCING**  
S301 1" = 1'-0"

## CITY OF FAIRBANKS PARKING GARAGE REPAIRS

ISSUE DATE 26 FEB 2021  
COMM. NUMBER 202001  
DESIGNED BY SMM  
DRAWN BY SMM  
SCALE 0" = 1"

## REPAIR DETAILS

# S301