

# University of Missouri For The Curators of the University of Missouri MU Project number CP220041 Advertisement Date: January 18, 2022 Various Locations - Repair Concrete in Steam Manholes

## Columbia, Boone County, Missouri

**CERTIFICATION:**

I HEREBY CERTIFY THESE DRAWINGS AND / OR SPECIFICATIONS HAVE BEEN PREPARED BY ME, OR UNDER MY SUPERVISION. I FURTHER CERTIFY THAT TO THE BEST OF MY KNOWLEDGE THESE DRAWINGS AND / OR SPECIFICATIONS ARE AS REQUIRED BY AND IN COMPLIANCE WITH THE BUILDING CODES OF THE UNIVERSITY OF MISSOURI

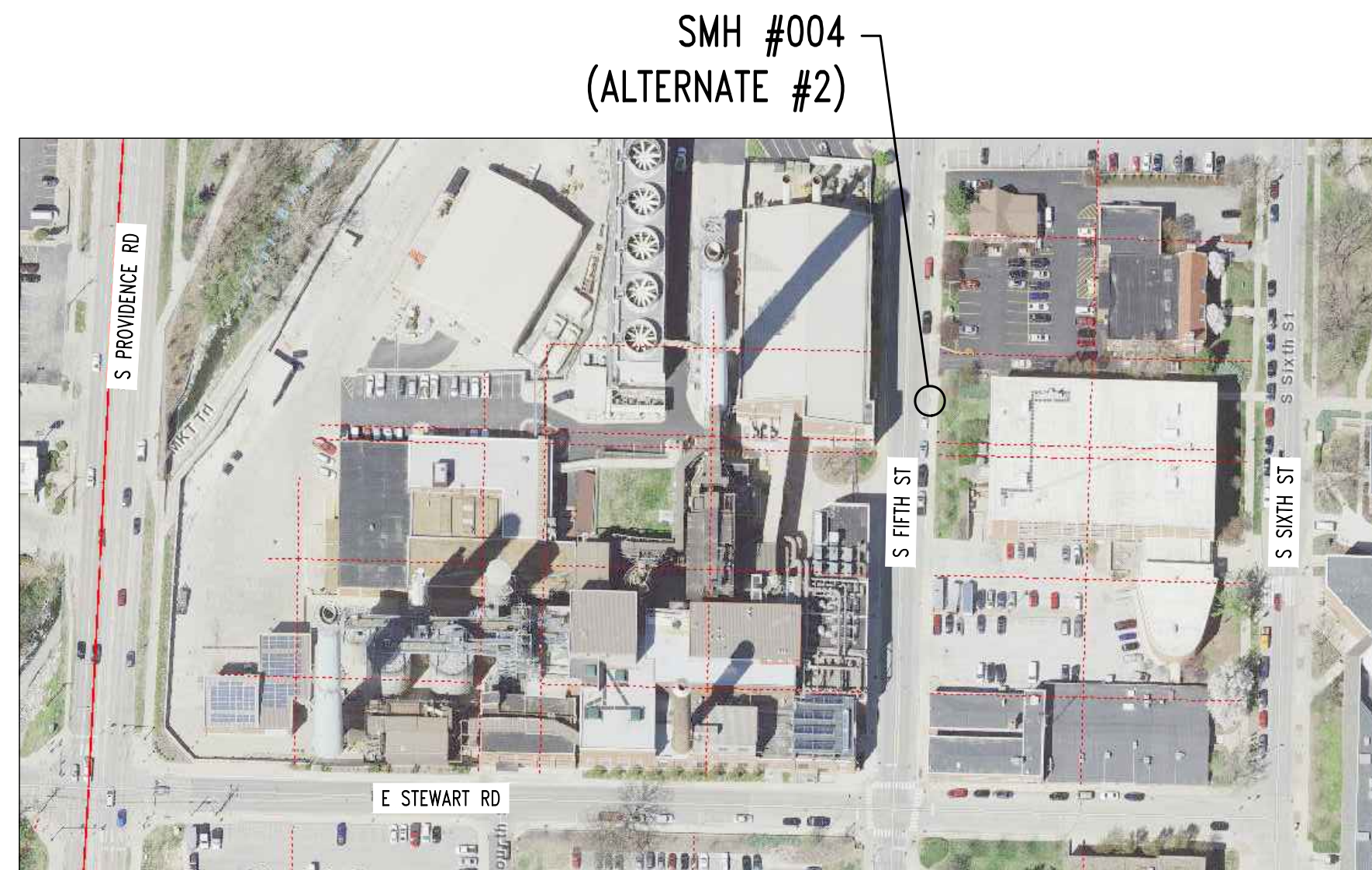
SIGNATURE: 

**SPECIAL INSPECTIONS**

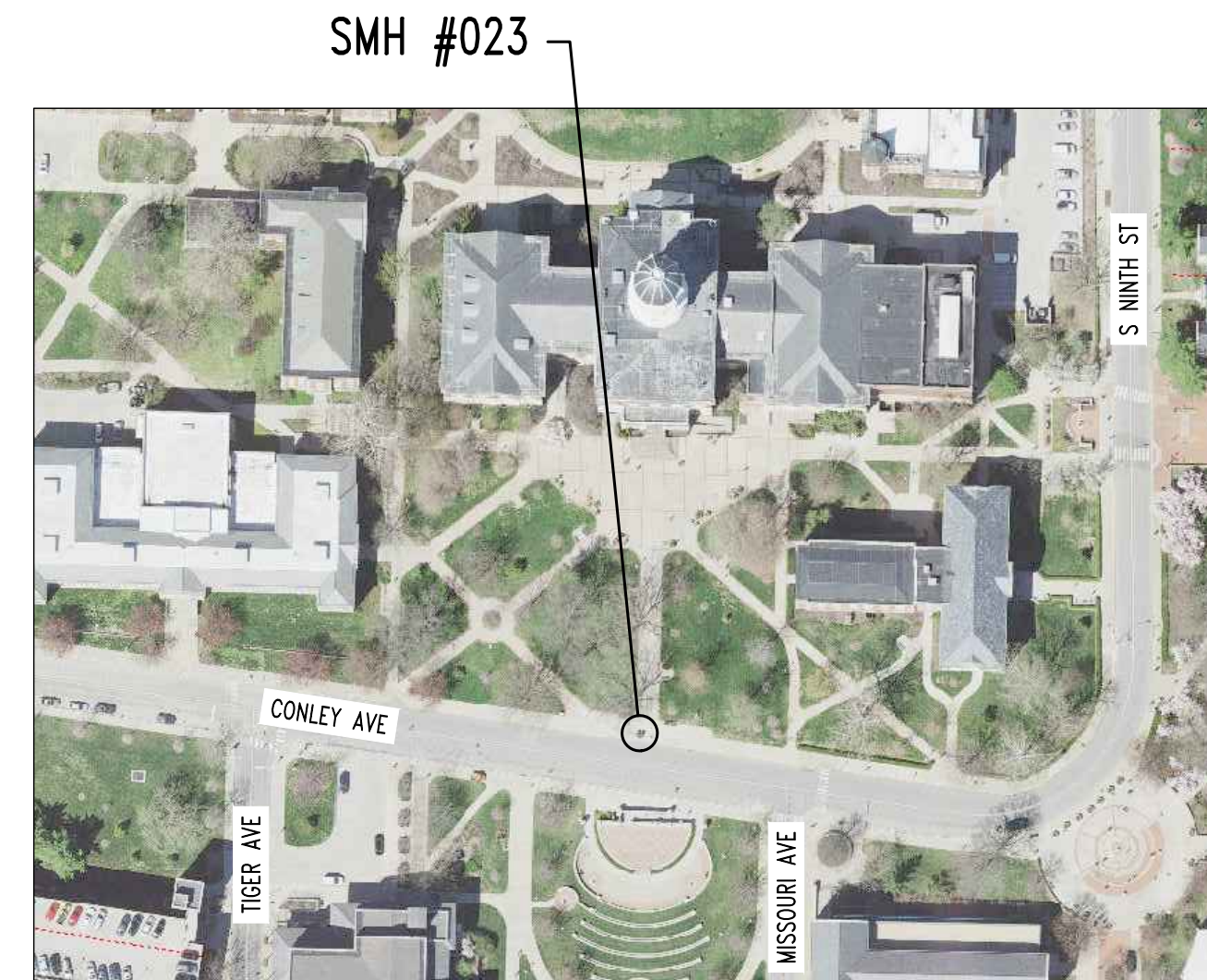
THE FOLLOWING ITEMS REQUIRE SPECIAL INSPECTION IN ACCORDANCE WITH CHAPTER 17 OF THE INTERNATIONAL BUILDING CODE.

- a. CONCRETE GROUT DESIGN MIX (PERIODIC)
- b. PLACING OF CONCRETE AND REINFORCING STEEL (CONTINUOUS OF CONCRETE SAMPLING / PERIODIC OF REINFORCING)
- c. BOLTS & ANCHORS EMBEDDED IN CONCRETE (PERIODIC)
- d. POST INSTALLED ANCHORS IN CONCRETE (CONTINUOUS)

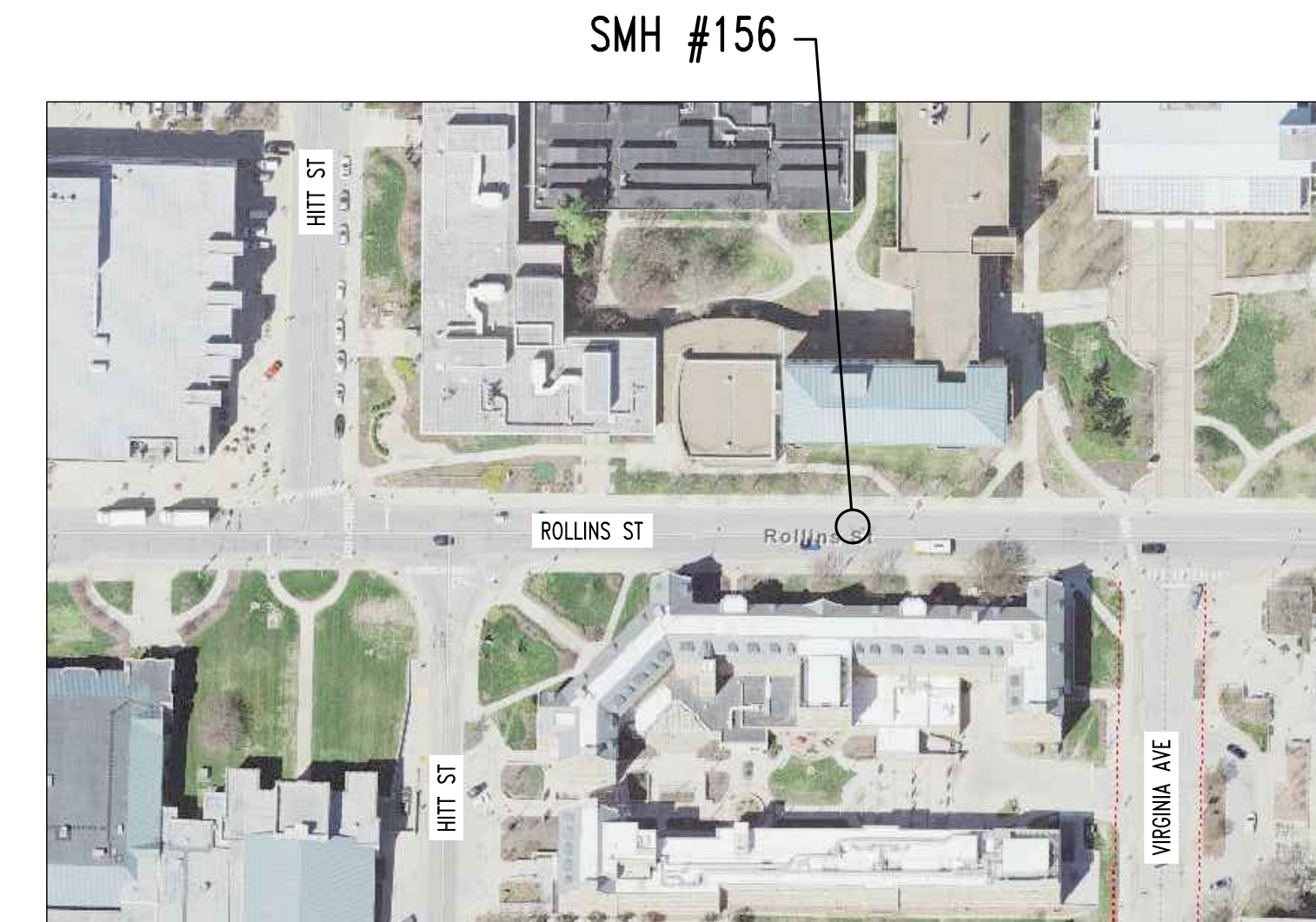
THE CONTRACTOR SHALL REQUEST SPECIAL INSPECTION OF THE ITEMS LISTED ABOVE PRIOR TO THOSE ITEMS BECOMING INACCESSIBLE AND UNOBSERVABLE DUE TO PROGRESSION OF THE WORK.



1 STEAM MANHOLE REPAIR SITE PLAN  
S100



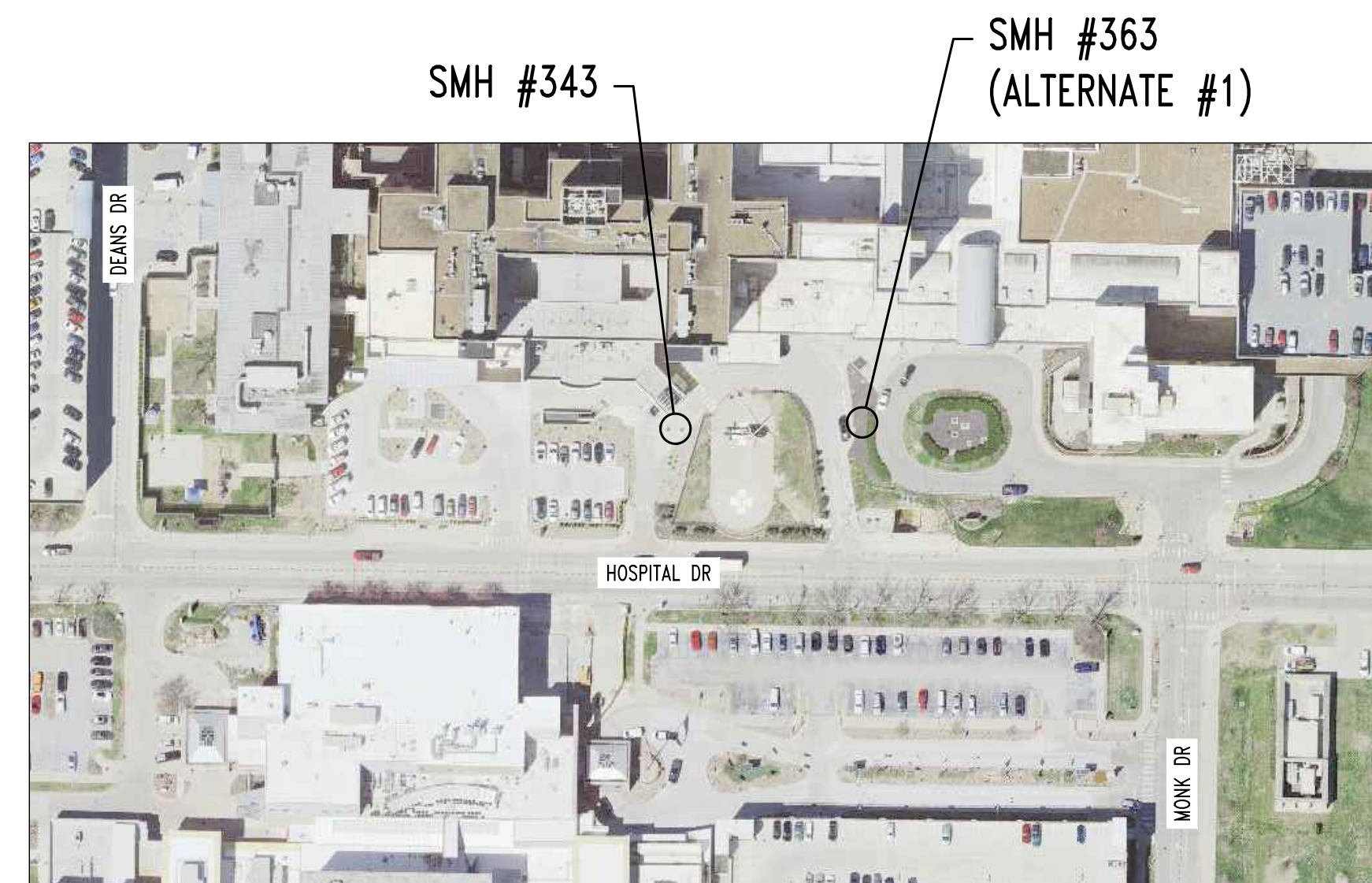
2 STEAM MANHOLE REPAIR SITE PLAN  
S100



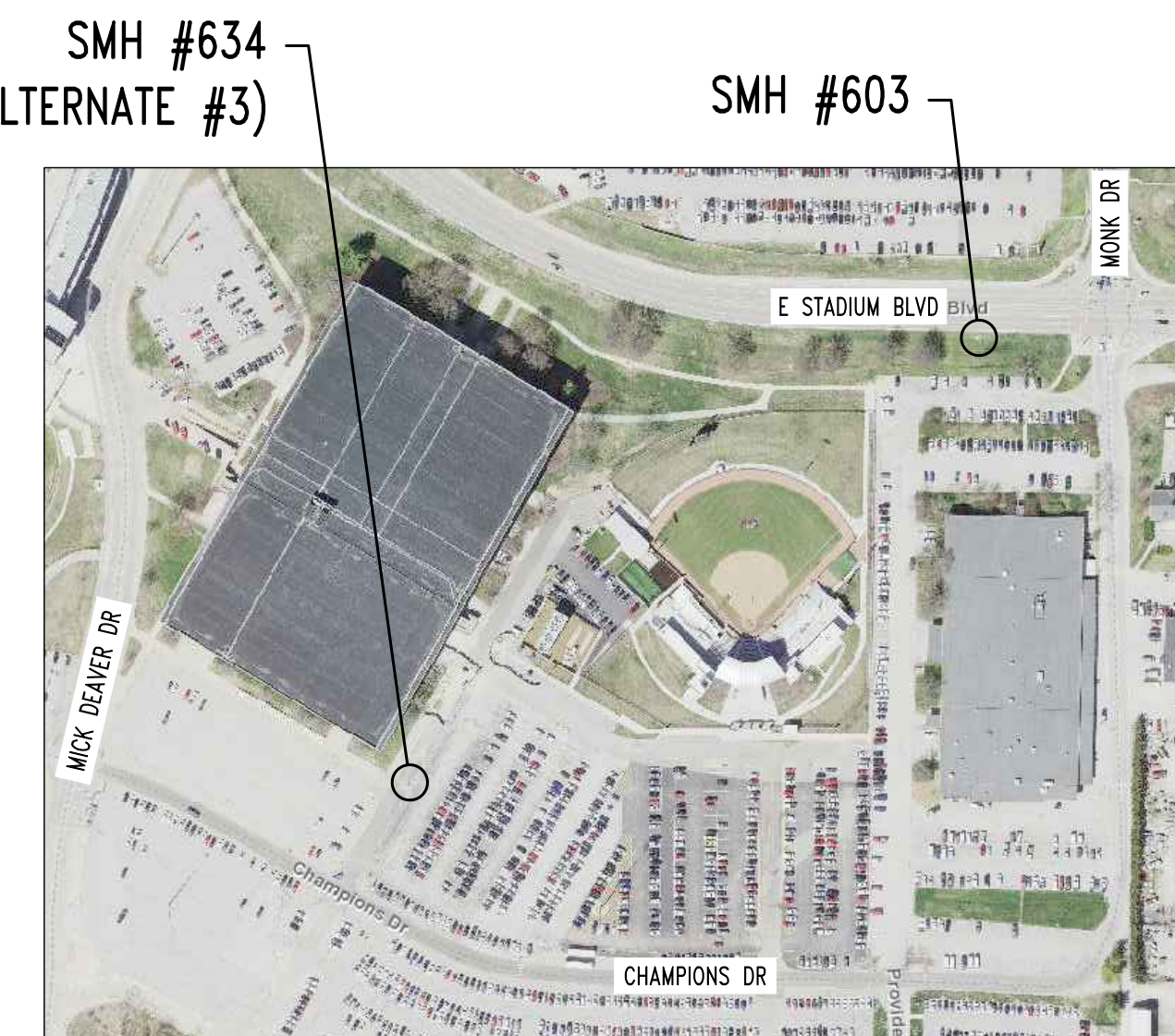
3 STEAM MANHOLE REPAIR SITE PLAN  
S100



4 STEAM MANHOLE REPAIR SITE PLAN  
S100



5 STEAM MANHOLE REPAIR SITE PLAN  
S100



6 STEAM MANHOLE REPAIR SITE PLAN  
S100

**NOTE:**

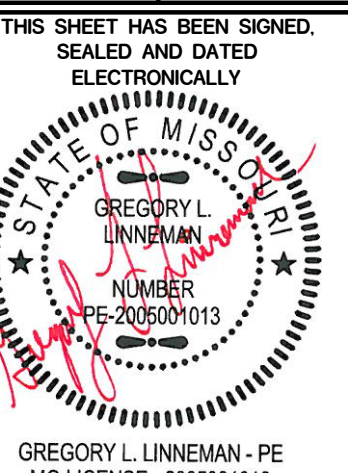
- 1. DISTURBANCE OF LANDSCAPE BEDS IS PROHIBITED & WILL BE REPAIRED @ CONTRACTOR'S EXPENSE.
- 2. CONTRACTOR IS NOT TO DISRUPT TRAFFIC FLOW.

**INDEX OF SHEETS**

COVER / GENERAL STRUCTURAL DATA / SITE PLANS	S100
TRAFFIC CONTROL PLAN	S101-S102
MANHOLE PLANS AND SECTIONS	S200-S204
MANHOLE PLANS AND SECTIONS (ALTERNATES)	S205-S207
MANHOLE REPAIR DETAILS	S300

**REVISIONS:**

No.	Date
BID SET	01/12/2022



**STRUCTURAL ENGINEER:**  
**CROCKETT**  
ENGINEERING CONSULTANTS  
1000 W. NINETY SEVENTH ST.  
COLUMBIA, MISSOURI 65205  
(314) 447-0292  
www.crockettengineering.com  
Crockett Engineering Consultants, LLC  
Missouri License # 2005001013

**CLIENT:**  
**UNIVERSITY OF MISSOURI**  
225 UNIVERSITY HALL  
COLUMBIA, MISSOURI 65211

**CP220041 - VARIOUS LOCATIONS  
REPAIR CONCRETE IN STEAM MANHOLES**  
**UNIVERSITY OF MISSOURI  
COLUMBIA, BOONE COUNTY, MISSOURI**

**DRAWING INCLUDES:**

GENERAL  
STRUCTURAL DATA  
& SITE PLANS

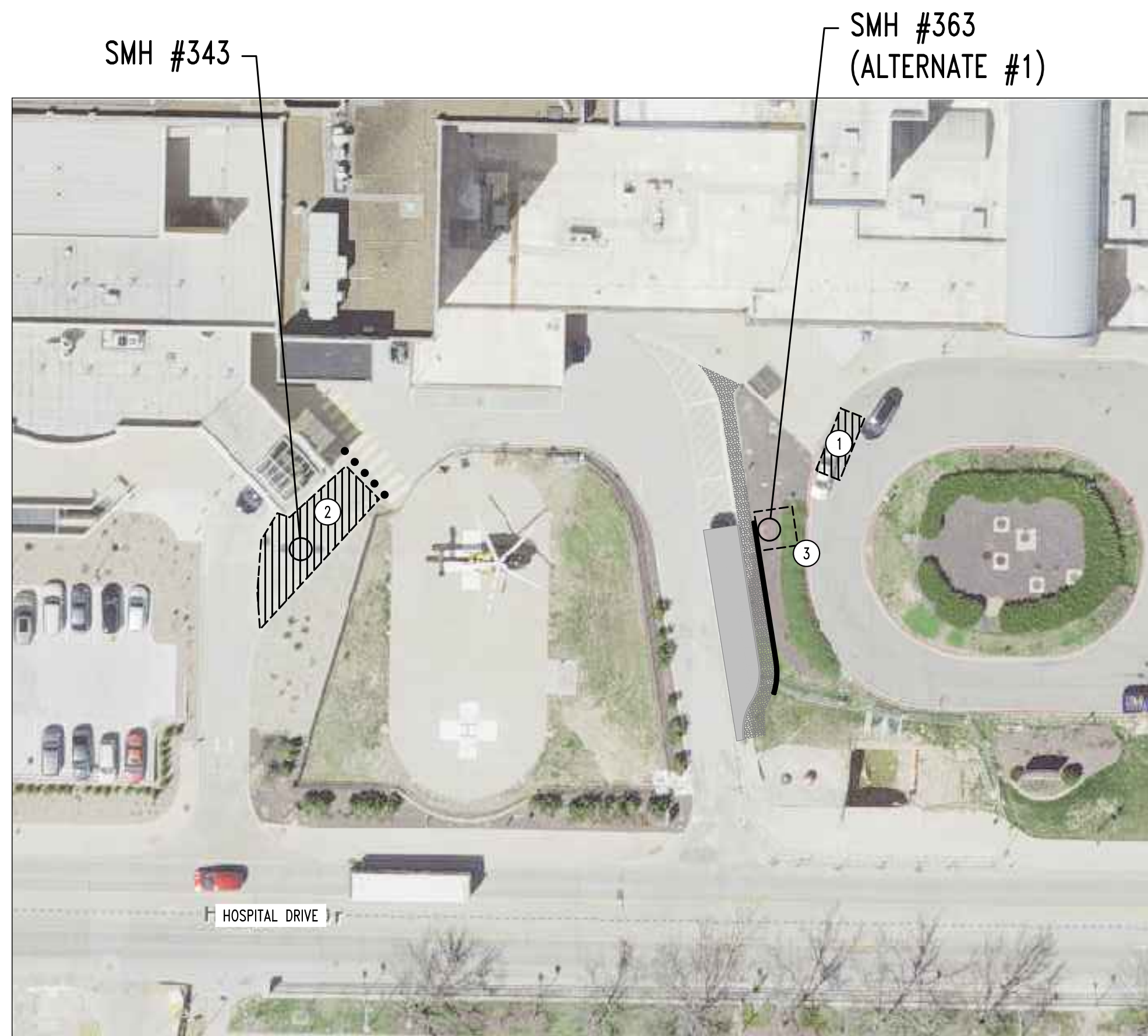
DESIGNED: GLL

DRAWN: RCA

PROJECT NO.: 180016

MU PROJECT NO.: CP220041

SHEET:  
S100



**HELIPAD NOTES - CAUTION!!!!**

CONTRACTOR SHALL MAINTAIN A WORK SITE FREE OF LOOSE MATERIAL AND DEBRIS AT ALL TIMES TO ALLOW FOR SAFE LANDING AND TAKE OFF OF HELICOPTER.

MAXIMUM HEIGHT OF EQUIPMENT AROUND HELIPAD SHALL BE COORDINATED WITH HOSPITAL SAFETY COORDINATOR TO ALLOW FOR SAFE OPERATION OF HELIPAD.

CONTRACTOR SHALL KEEP ALL UTILITIES IN OPERATION TO THE HELIPAD AT ALL TIMES.

CONTRACTOR SHALL MAINTAIN A CLEAR PATHWAY FROM HELIPAD TO EMERGENCY ROOM AT ALL TIMES.

WORK TO CEASE WHEN HELIPAD IS IN USE.

REFERENCE DAILY HELIPAD AREA CONSTRUCTION INSPECTION CHECKLIST ON THIS SHEET.

**Health Care**

Date: \_\_\_\_\_ NOTE: Non-construction site related issues should be reported to MUHC Helicopter Program Manager, Joan Drake 882-6003 or the Safety Coordinator, Cliff Tebbe, 573-239-4763

Inspector's Name: \_\_\_\_\_

**Helipad Area Construction Inspection Checklist**

Criteria	Y	N	N/A
1 All trash and loose debris removed from area impacted by rotor wash, to include removal of any trash receptacle?			
2 Have all spoils been removed from the site or managed in such a way as to minimize "dust up", e.g. regular wetting, covered and cover secured, etc.?			
3 Have disturbed sites lacking grass/vegetation been substantially wetted to minimize dust up?			
4 Are all trenches and pits covered? If steel plating isn't used, is the trench cover substantially weighed down with closed sand tubes?			
5 Are all tools, materials and equipment secured to prevent incident due to rotorwash?			
6 Has the work site been inspected at the end of each day's work to verify all required safety precautions have been addressed?			

Comments: \_\_\_\_\_

Inspector's Signature: \_\_\_\_\_

**NOTES**

- CONTRACTOR ALLOWED (1) VEHICLE IN CIRCLE DRIVE WHEN WORKING SMH #363 ONLY. FOLLOW HELIPAD NOTES.
- CONTRACTOR ALLOWED (1) VEHICLE IN HATCHED AREA DURING WORK @ SMH #343. DRIVE LANE TO BE CONED OFF FROM ADJACENT LANE. ACCESS PATH TO HELIPAD TO BE MAINTAINED AS CURRENTLY STRIPED. FOLLOW HELIPAD NOTES, SEE SHEET S204 FOR REMAINING INFO.
- MOVE LANDSCAPE GRAVEL TO SIDE, THEN RAISE EXISTING GRADE @ SMH #363 ONLY w/ TYPE 5 GRANULAR FILL TO ALLOW FOR 6'-0" SQUARE x 6" THICK SLAB TO BE CAST AROUND RAISED MANHOLE LID. SEE SHEET S205 FOR REMAINING INFO. COORDINATE WORK w/ ADJACENT PROJECT THAT MAY BE IN THE SAME AREA.
- CONTRACTOR MAY GAIN ACCESS TO SMH #603 BY BLOCKING A SINGLE PARKING SPOT & REMOVING A SECTION OF EXISTING FENCING. VEHICLES WILL REQUIRE MATS TO DRIVE IN GRASS AREAS. CONTRACTOR SHALL COORDINATE SHOULDER CLOSURE w/ MoDOT. SEE SHEET S206 FOR REMAINING INFO.

**REVISIONS:**

No.	Date
BID SET	01/12/2022



STRUCTURAL ENGINEER  
**CROCKETT**  
 ENGINEERING CONSULTANTS  
 1000 W. N. BRIDGES BLVD. SUITE 400  
 COLUMBIA, MISSOURI 65203  
 www.crockettengineering.com  
 Missouri License Authority  
 License No. 200501013

UNIVERSITY OF MISSOURI  
 225 UNIVERSITY HALL  
 COLUMBIA, MISSOURI 65211

CLIENT:

**CP220041 - VARIOUS LOCATIONS  
 REPAIR CONCRETE IN STEAM MANHOLES**  
 UNIVERSITY OF MISSOURI  
 COLUMBIA, BOONE COUNTY, MISSOURI

**DRAWING INCLUDES:**

SITE PLAN

DESIGNED: GLL

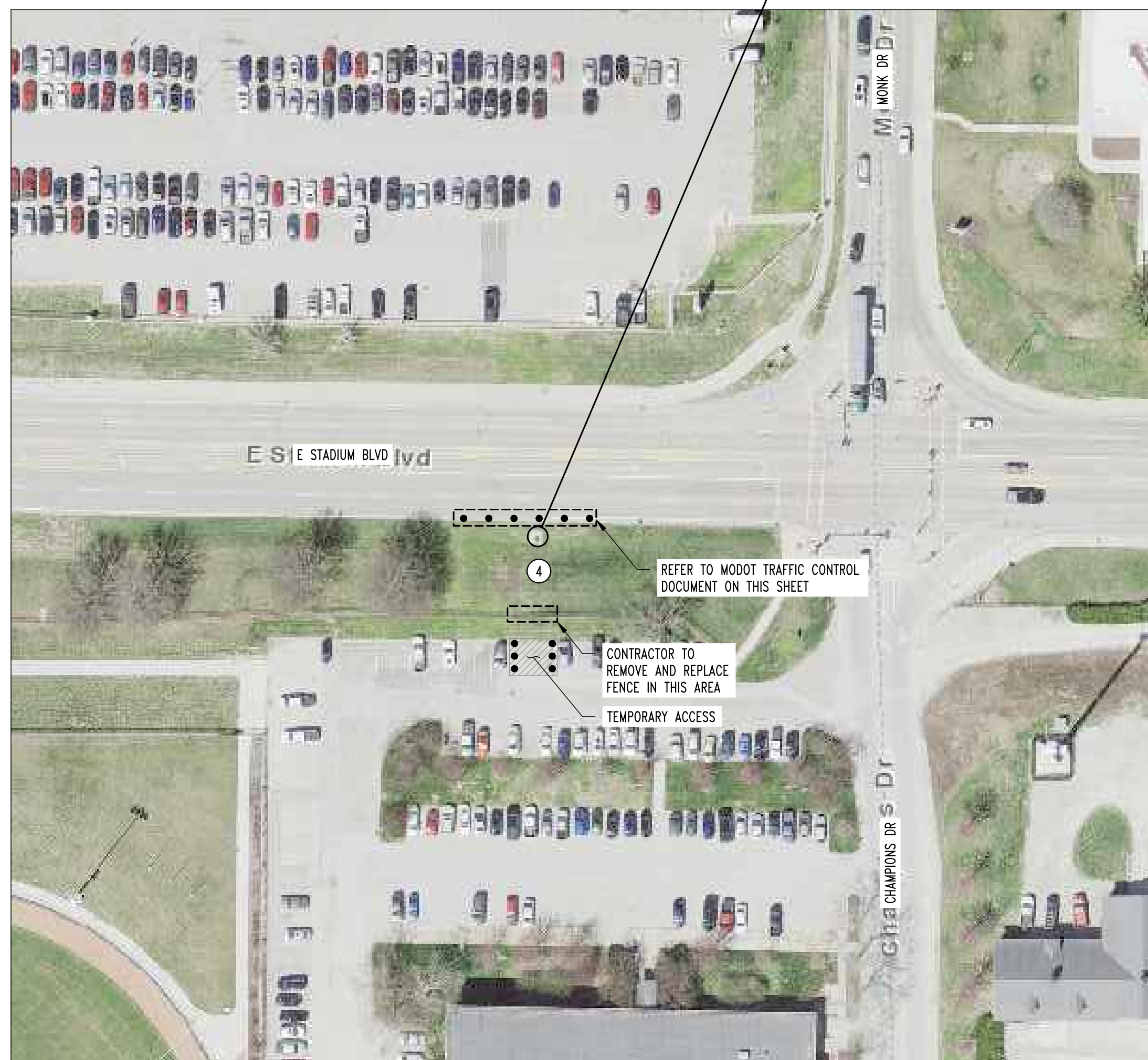
DRAWN: RCA

PROJECT NO.: 180016

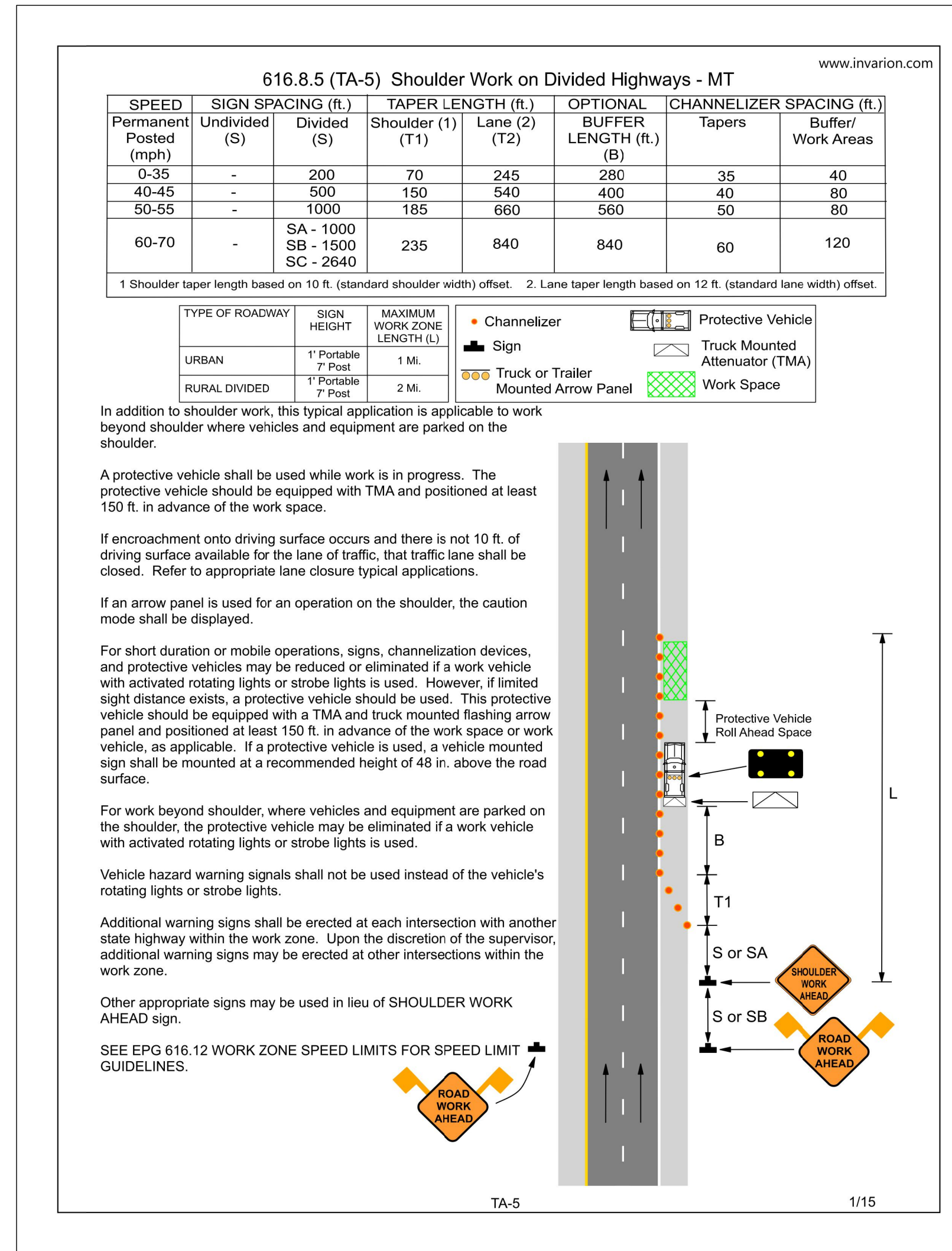
MU PROJECT NO.: CP220041

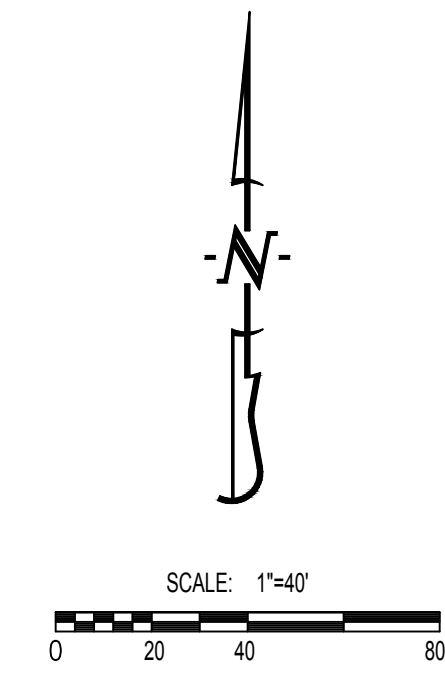
SHEET: S101

**1 SITE PLAN**



**2 SITE PLAN**





**GENERAL NOTES**

TRAFFIC CONTROL DEVICES SHALL COMPLY WITH THE MUTCD.  
 CONTRACTOR SHALL MAINTAIN A MINIMUM CLEAR LANE WIDTH OF 11' AT ALL TIMES.  
 CONTRACTOR SHALL REFER TO THE CURRENT EDITION OF THE MUTCD MANUAL OF TRAFFIC CONTROL FOR FIELD OPERATIONS FOR INFORMATION ON THE PROPER DEPLOYMENT OF TRAFFIC CONTROL DEVICES.  
 BOTH LANES OF TRAFFIC TO REMAIN OPEN AT ALL TIMES.

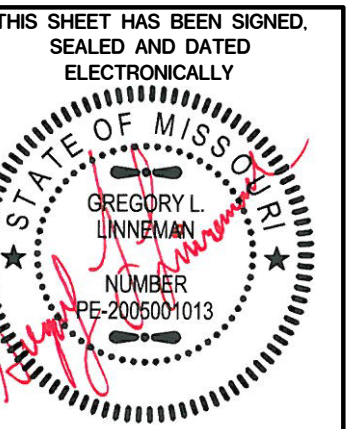
**SCHEDULING OF CLOSURES**

ALL WORK IS TO BE DONE BETWEEN MAY 30, 2022 – AUGUST 10, 2022.  
 CONTRACTOR IS TO SPECIFY EXACT DATES OF WORK.  
 REGULARLY SCHEDULED WORK SHALL BE COMPLETED BETWEEN 7:00AM AND 7:00PM ON WEEKDAYS AND 9:00AM TO 5:00PM ON SATURDAYS. APPLICATION FOR EXTENDED WORK HOURS SHALL BE COMPLETED AND APPROVED BY THE DIRECTOR OF PUBLIC WORKS FOR ANY TIMES OTHER THAN THESE.  
 THE CONTRACTOR IS RESPONSIBLE FOR NOTIFYING CITY OF COLUMBIA SITE DEVELOPMENT AT LEAST ONE WEEK PRIOR TO THE START OF ANY CLOSURE ONCE CLOSURE APPROVAL HAS BEEN GIVEN.  
 CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE FOLLOWING AGENCIES, AS REQUIRED, IMMEDIATELY PRIOR TO CLOSURE OF STREET, DURING CONSTRUCTION FOR INSPECTIONS AND AGAIN WHEN WORK IS COMPLETE AND STREET IS REOPENED:

SITE DEVELOPMENT (ROW INSPECTIONS)	874-7474
BUILDING SAFETY (PLUMBING/BUILDING INSPECTIONS)	874-7474
JOINT COMMUNICATIONS (EMERGENCY SERVICES)	874-8471
COLUMBIA TRANSIT (CITY BUSES)	874-7282
PARKING ENFORCEMENT (PARKING METERS)	874-7674
PUBLIC WORKS STREET DIVISION (STREET PATCHING)	874-6289
UNIVERSITY OF MISSOURI POLICE DEPARTMENT	882-7201

TRAFFIC CONTROL DEVICE LEGEND (ALL SIGNS TO BE ORANGE OR FLUORESCENT ORANGE)			
	PLACE STANDARD HIGHWAY SIGN (MUTCD SIGN # W20-1 SHOULD READ "ROAD WORK AHEAD"). SIGN SHALL BE 48" X 48" MIN.		PLACE STANDARD CONE CHANNELIZER WITH REFLECTIVE BAND. CONE SHALL BE 36" MIN. TALL.
	VEHICLE TO BE USED WITH WARNING DEVICE TO HELP WARN PASSING TRAFFIC AND CREATE A BARRIER TO WORKING AREA.		

No.	Date
BID SET	01/12/2022



GREGORY L. LINNEHAN - PE  
 MISSOURI LICENSE - 2005001013

STRUCTURAL ENGINEER  
**CROCKETT**  
 ENGINEERS AND ARCHITECTS  
 1000 W. MISSOURI DRIVE  
 COLUMBIA, MISSOURI 65203  
 (573) 447-0292  
 www.crockettengineering.com  
 Crockett Engineering Consultants, LLC  
 Missouri Professional Authority  
 2005019101

CLIENT:  
**UNIVERSITY OF MISSOURI**  
 225 UNIVERSITY HALL  
 COLUMBIA, MISSOURI 65211

**CP220041 - VARIOUS LOCATIONS  
 REPAIR CONCRETE IN STEAM MANHOLES**  
 UNIVERSITY OF MISSOURI  
 COLUMBIA, BOONE COUNTY, MISSOURI

DRAWING INCLUDES:  
 TRAFFIC CONTROL PLAN

DESIGNED: GLL  
 DRAWN: RCA  
 PROJECT NO.: 180016  
 MU PROJECT NO.: CP220041

SHEET:  
 S102

**GENERAL NOTES**

- CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL TEMPORARY COOLING AND VENTILATION AS NEEDED TO PERFORM WORK INSIDE THE MANHOLES AND TUNNEL. COOLING AND VENTILATION WILL BE REQUIRED FOR PORTIONS OF THIS PROJECT.
- ALL CONCRETE PATCHING/REPAIR DETAILS AND NOTES ARE PROVIDED ON SHEET S300.
- ALL REINFORCING TO BE MMFX/CHROME X REBAR.
- ALL DAMAGE TO GALVANIZING TO BE REPAIRED w/ HOT GALVANIZING BY CONTRACTOR.
- ALL EXPOSED STEEL TO BE HOT DIPPED GALVANIZED INCLUDING BOLTS, WASHERS, ETC.

REVISIONS:

No.	Date
BID SET	01/12/2022

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY  
 STATE OF MISSOURI  
 GREGORY L. LINNEMAN  
 NUMBER  
 PE-2005001013  
 MISSOURI PROFESSIONAL ENGINEER  
 GREGORY L. LINNEMAN - PE  
 MO LICENSE - 2005001013

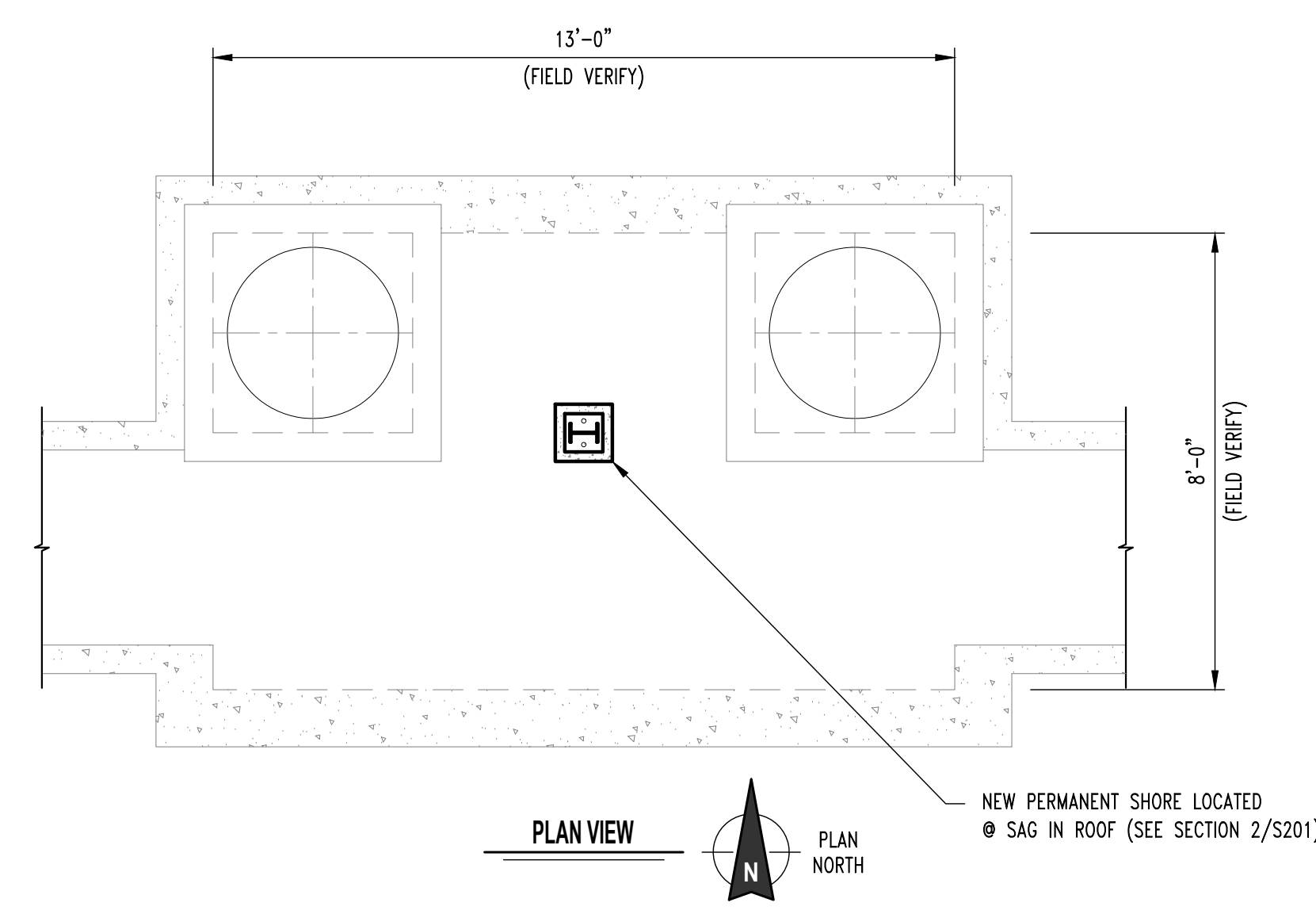
STRUCTURAL ENGINEER  
**CROCKETT**  
 ENGINEERING CONSULTANTS  
 1000 W. MISSOURI DRIVE  
 COLUMBIA, MISSOURI 65203  
 (314) 447-0292  
 www.crockettengineering.com  
 Crockett Engineering Consultants, LLC  
 Missouri License # 0000001013

CLIENT:  
 UNIVERSITY OF MISSOURI  
 225 UNIVERSITY HALL  
 COLUMBIA, MISSOURI 65211

PROJECT:  
**CP220041 - VARIOUS LOCATIONS  
 REPAIR CONCRETE IN STEAM MANHOLES**  
 UNIVERSITY OF MISSOURI  
 COLUMBIA, BOONE COUNTY, MISSOURI

DRAWING INCLUDES:  
 SMH #023  
 PLAN & PHOTOS

DESIGNED: GLL  
 DRAWN: RCA  
 PROJECT NO.: 180016  
 MU PROJECT NO.: CP220041  
 SHEET: S200



1 EXPOSED REBAR, SEE REPAIR NOTE 2.

**SMH #023 - CONLEY AVE**



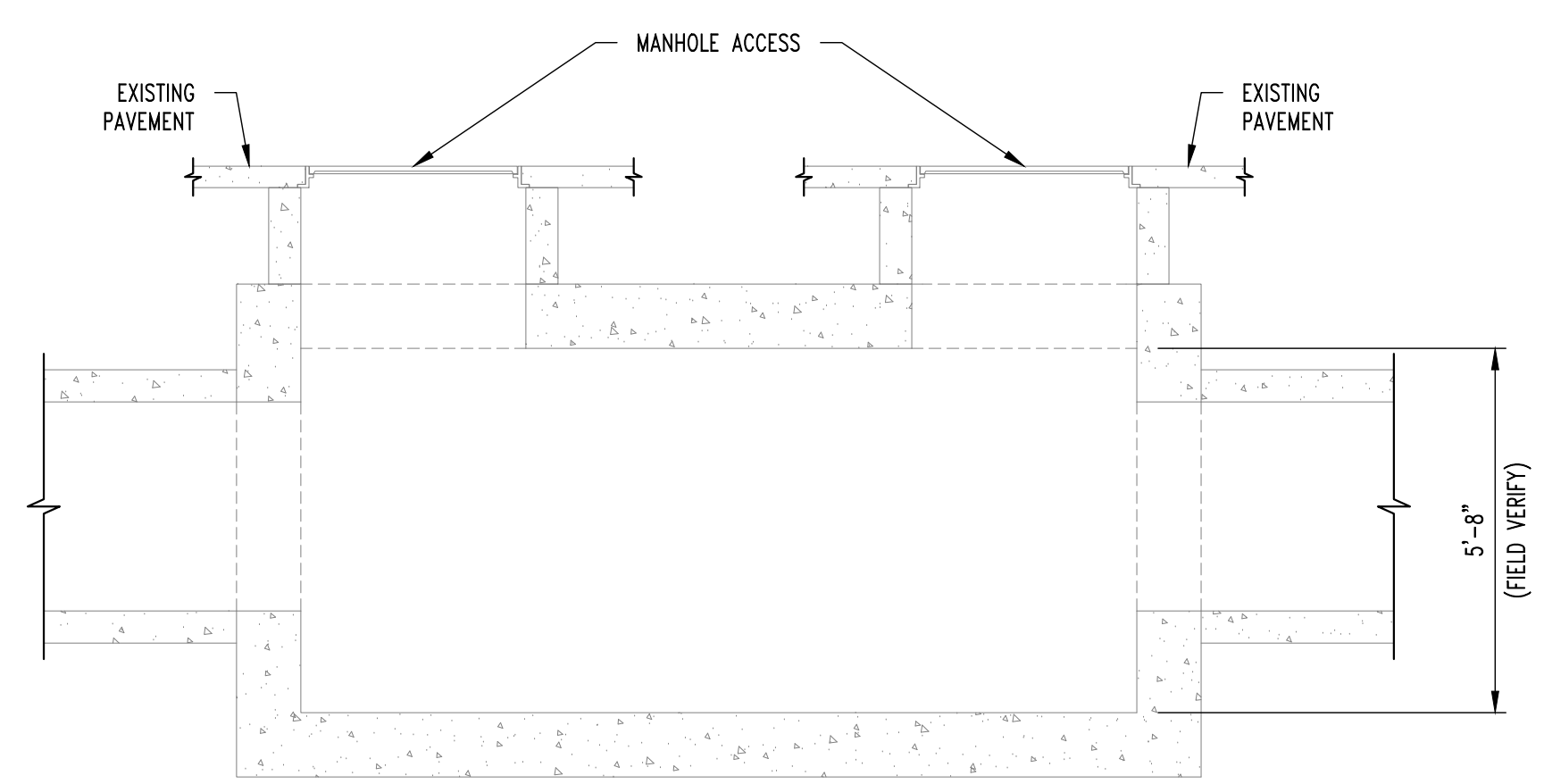
1 EXPOSED REBAR, SEE REPAIR NOTE 2.

**SMH #023 - CONLEY AVE**



1 CONCRETE CRACK, SEE REPAIR NOTE 5.

**SMH #023 - CONLEY AVE**



1  
 S200  
**STEAM MANHOLE #023**  
 SCALE: 3/8" = 1'-0"



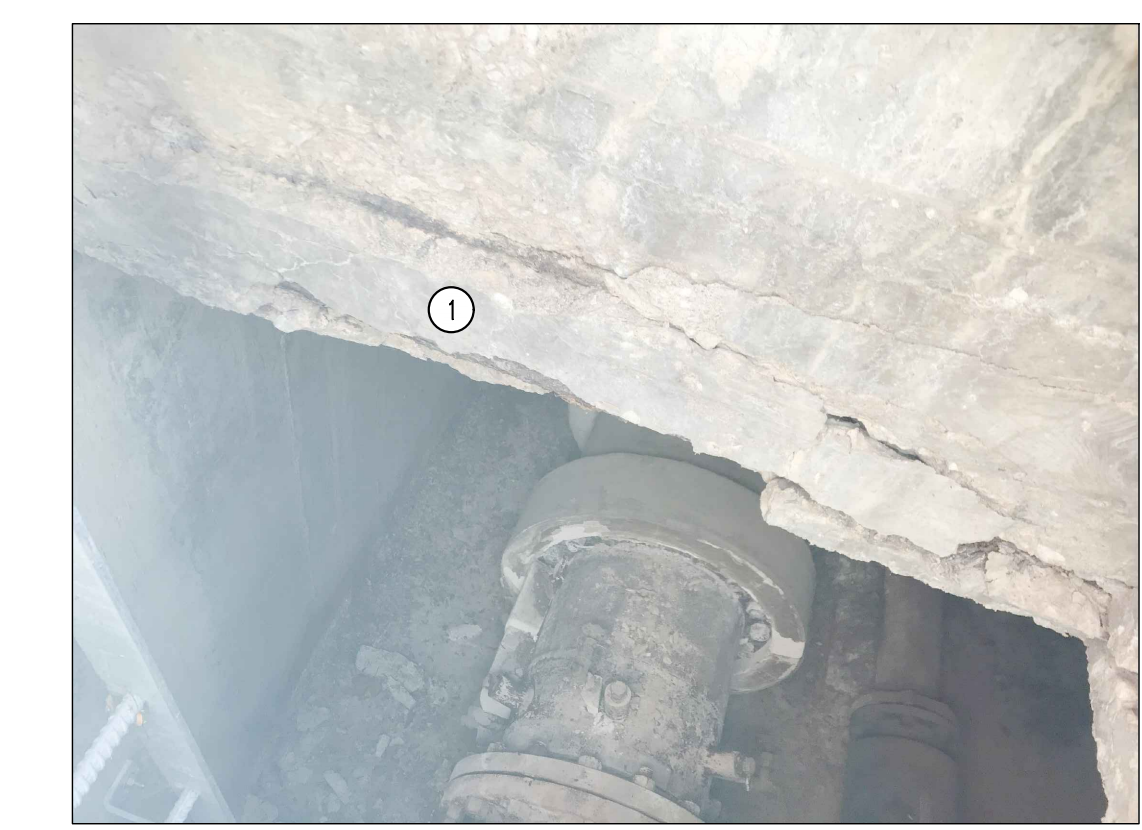
1 SPALLED CONCRETE, SEE REPAIR NOTE 4.

**SMH #023 - CONLEY AVE**



1 EXPOSED REBAR, SEE REPAIR NOTE 2.

**SMH #023 - CONLEY AVE**

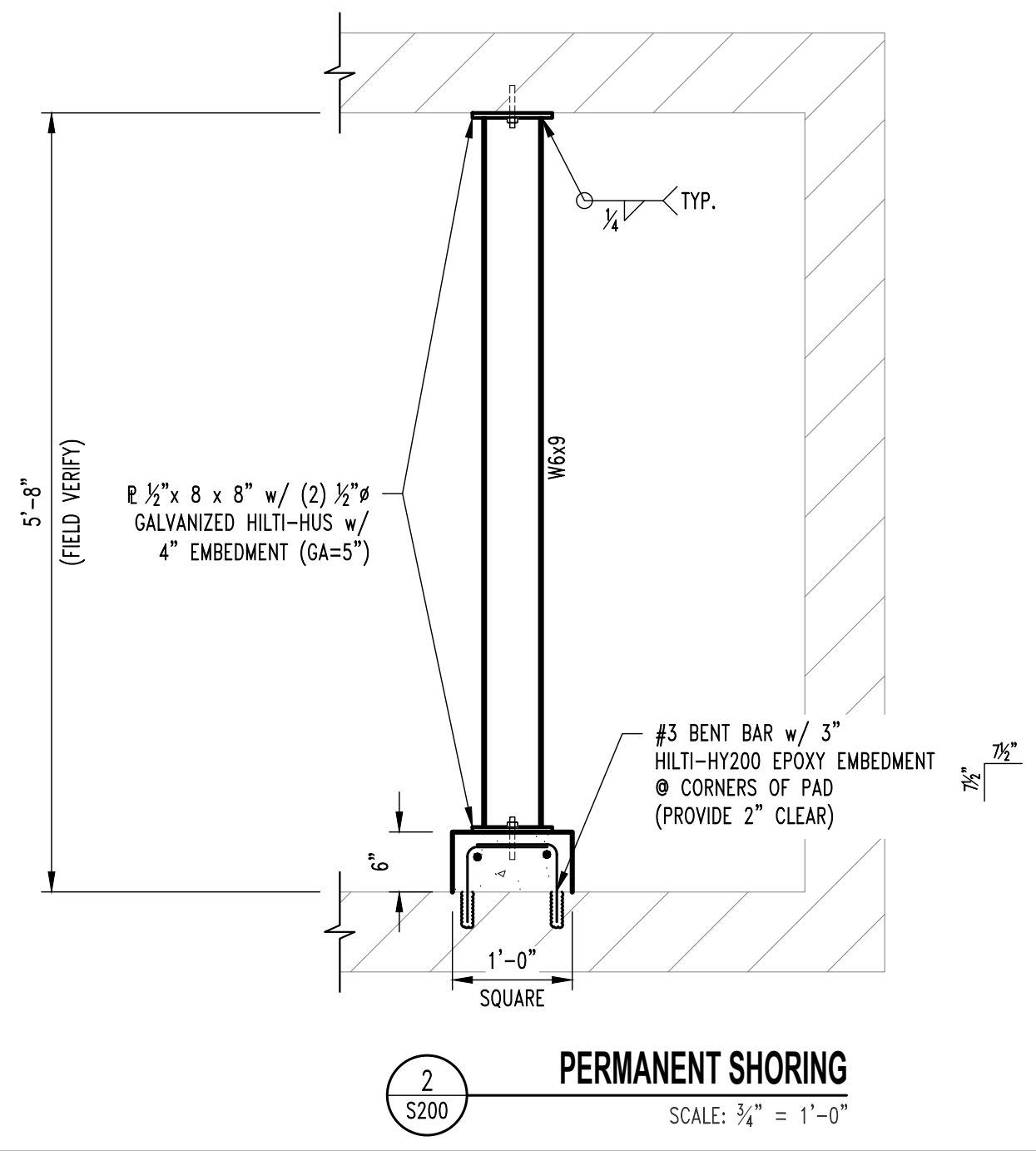


1 SPALLED CONCRETE, SEE REPAIR NOTE 4.

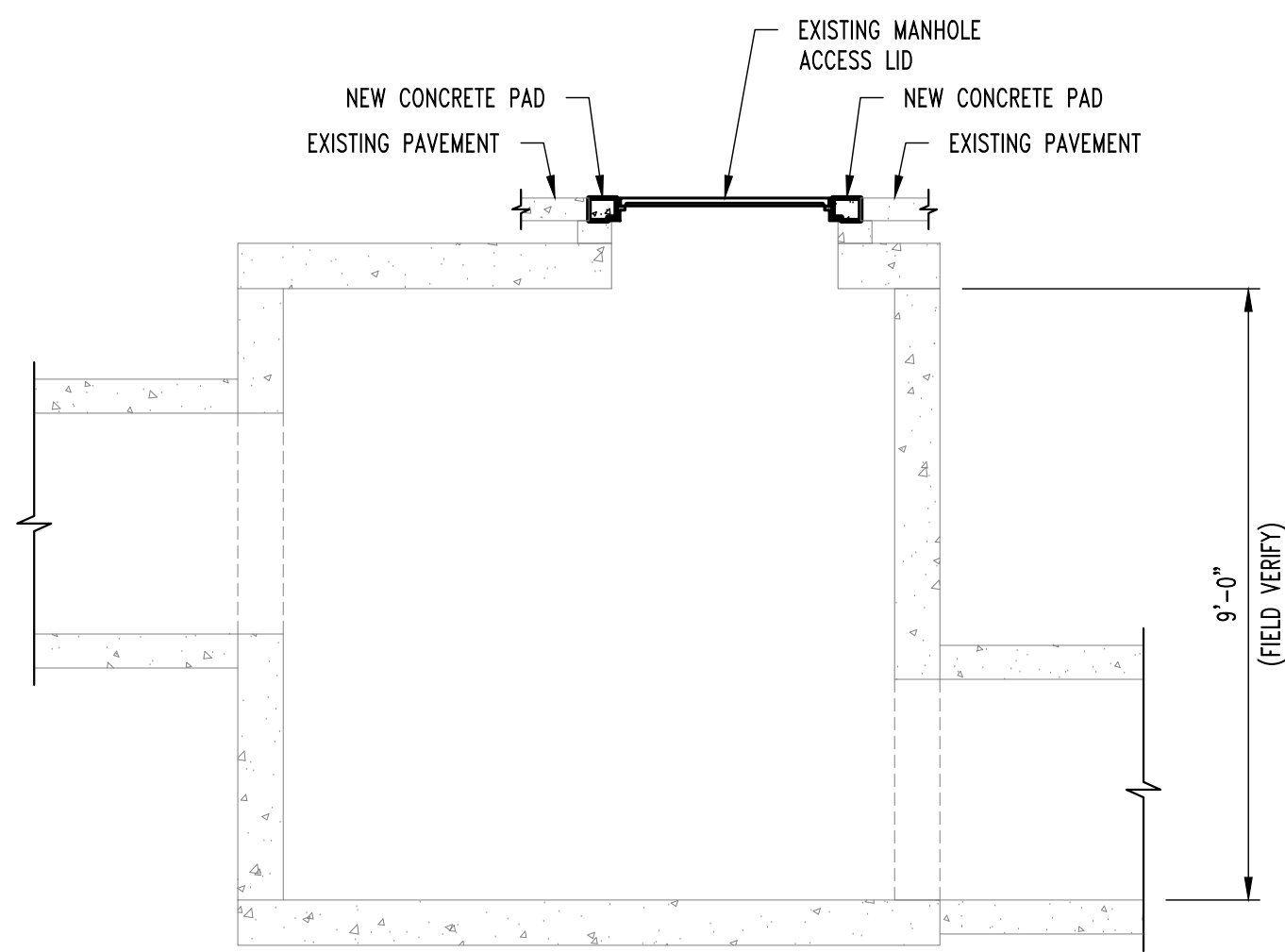
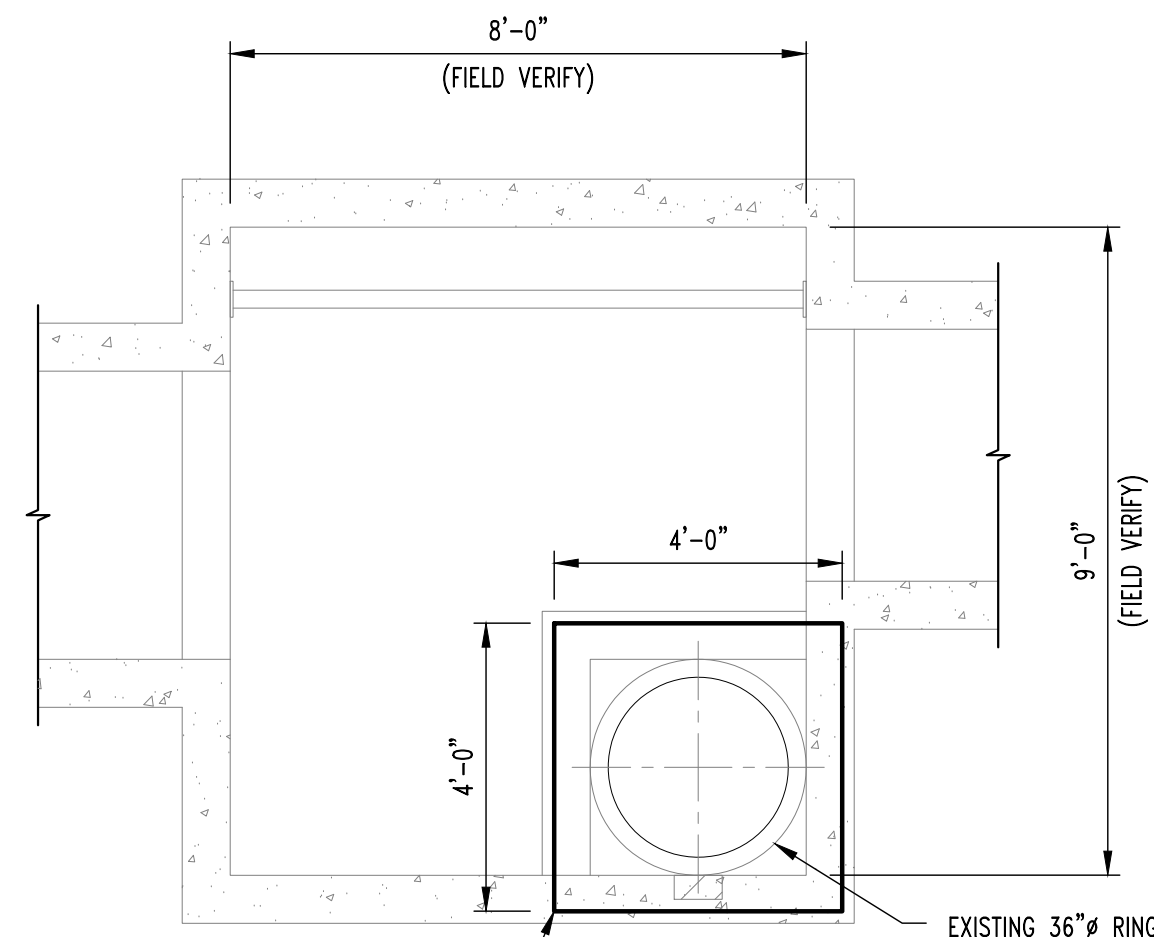
**SMH #023 - CONLEY AVE**

**REPAIR NOTES**

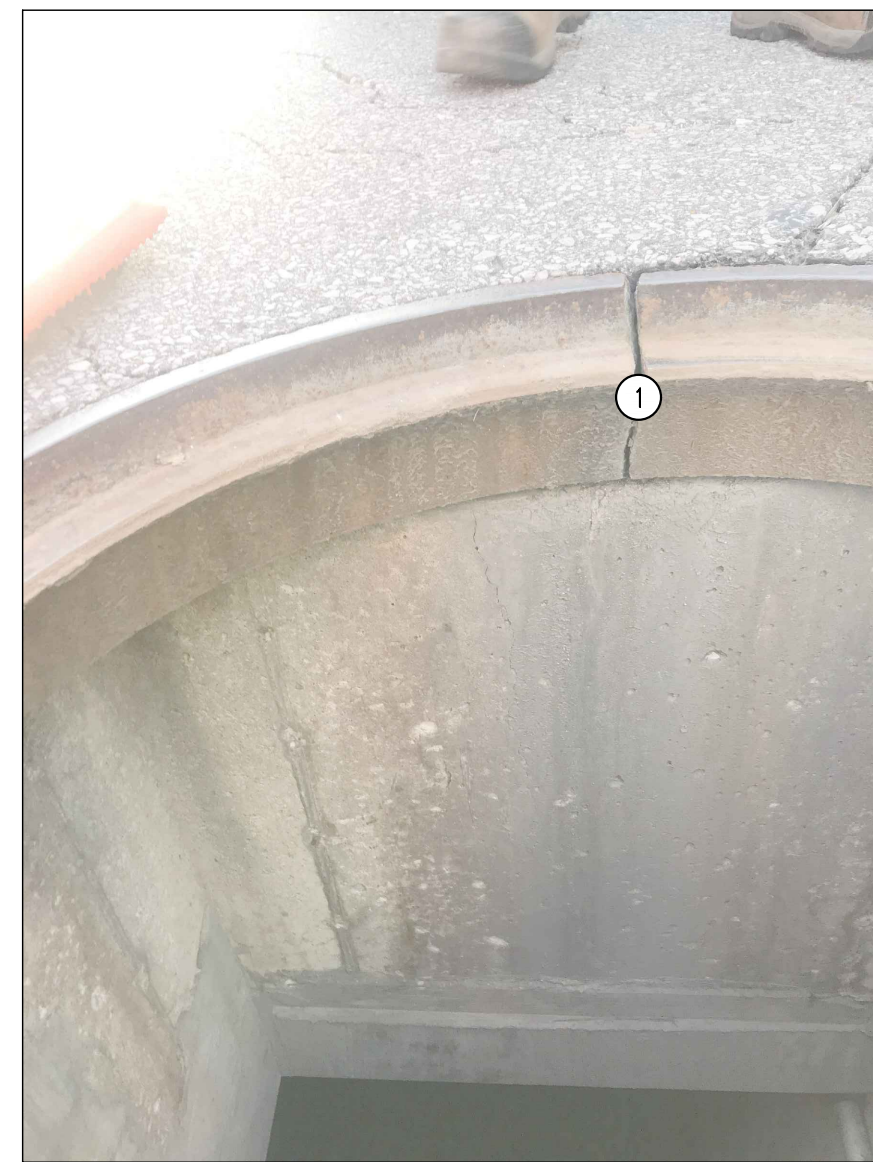
- SMH #023 APPROXIMATE REPAIR AREAS
- IN THE LID AROUND THE WEST RISER THERE IS REBAR EXPOSED AND 18 INCH WIDE SPALLING ON BOTH SIDES X 3 INCH DEEP. (REPAIR #3 EXPECTED)
  - IN THE LID AROUND THE EAST RISER AND 12 INCHES INTO THE RISER THERE IS SPALLED CONCRETE 18 INCH WIDE ON BOTH SIDES X 2 INCH DEEP. (REPAIR #2 EXPECTED)
  - JUST UNDER THE WEST MANHOLE LID, THERE IS SPALLED CONCRETE 3 INCHES TALL X 24 INCHES WIDE X 2 INCHES DEEP. (REPAIR #2 EXPECTED)
  - THE EAST CHASE LOWER NORTH CORNER HAS SPALLED 4 INCHES THICK X 18 INCHES LONG X 6 INCHES DEEP. (REPAIR #3 EXPECTED)
  - THERE ARE A TOTAL OF 7 FEET OF CRACKS THAT WILL NEED TO BE EPOXY INJECTED WITH SIKADUR INJECTION GEL OR APPROVED EQUAL AT BOTH CHASE OPENINGS.



2  
 S200  
**PERMANENT SHORING**  
 SCALE: 3/4" = 1'-0"

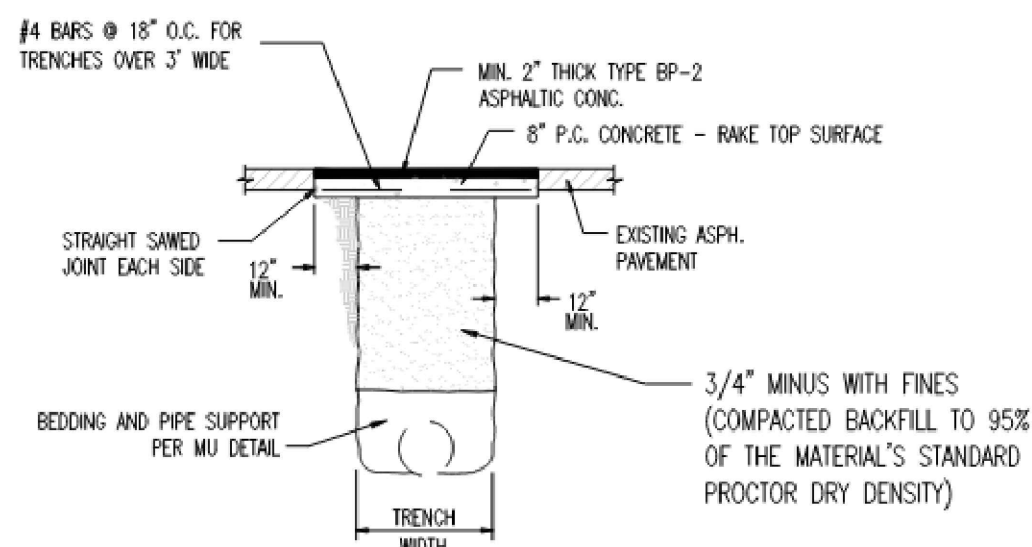


1  
S201  
**STEAM MANHOLE #156**  
SCALE: 3/8" = 1'-0"



1 CRACKED CAST IRON RING, SEE REPAIR NOTE 1.

**SMH #156 - ROLLINS ST**



EXISTING ASPHALTIC PAVEMENT

NOTES: CONCRETE SHALL BE CLASS AA  
REINFORCING STEEL SHALL BE GRADE 60

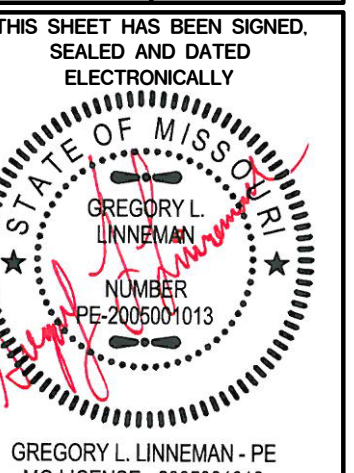
ASPHALT PAVEMENT PATCH

**GENERAL NOTES**

- CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL TEMPORARY COOLING AND VENTILATION AS NEEDED TO PERFORM WORK INSIDE THE MANHOLES AND TUNNEL. COOLING AND VENTILATION WILL BE REQUIRED FOR PORTIONS OF THIS PROJECT.
- ALL CONCRETE PATCHING/REPAIR DETAILS AND NOTES ARE PROVIDED ON SHEET S300.
- ALL REINFORCING TO BE MMFX/CHROME X REBAR.
- ALL DAMAGE TO GALVANIZING TO BE REPAIRED w/ HOT GALVANIZING BY CONTRACTOR.
- ALL EXPOSED STEEL TO BE HOT DIPPED GALVANIZED INCLUDING BOLTS, WASHERS, ETC.

**REVISIONS:**

No.	Date
BID SET	01/12/2022



GREGORY L. LINNEMAN - PE  
MO LICENSE - 2005001013

STRUCTURAL ENGINEER:  
**CROCKETT**  
ENGINEERING CONSULTANTS  
1000 W. N. BRIDGES BLVD., SUITE 200  
COLUMBIA, MISSOURI 65203  
(314) 447-0292  
www.crockettengineering.com  
Crockett Engineering Consultants, LLC  
Missouri Professional Authority  
#2005001013

UNIVERSITY OF MISSOURI  
228 UNIVERSITY HALL  
COLUMBIA, MISSOURI 65211

CLIENT:

**CP220041 - VARIOUS LOCATIONS  
REPAIR CONCRETE IN STEAM MANHOLES**  
  
UNIVERSITY OF MISSOURI  
COLUMBIA, BOONE COUNTY, MISSOURI

**DRAWING INCLUDES:**

SMH #156  
PLAN & PHOTOS

DESIGNED: GLL

DRAWN: RCA

PROJECT NO.: 180016

MU PROJECT NO.: CP220041

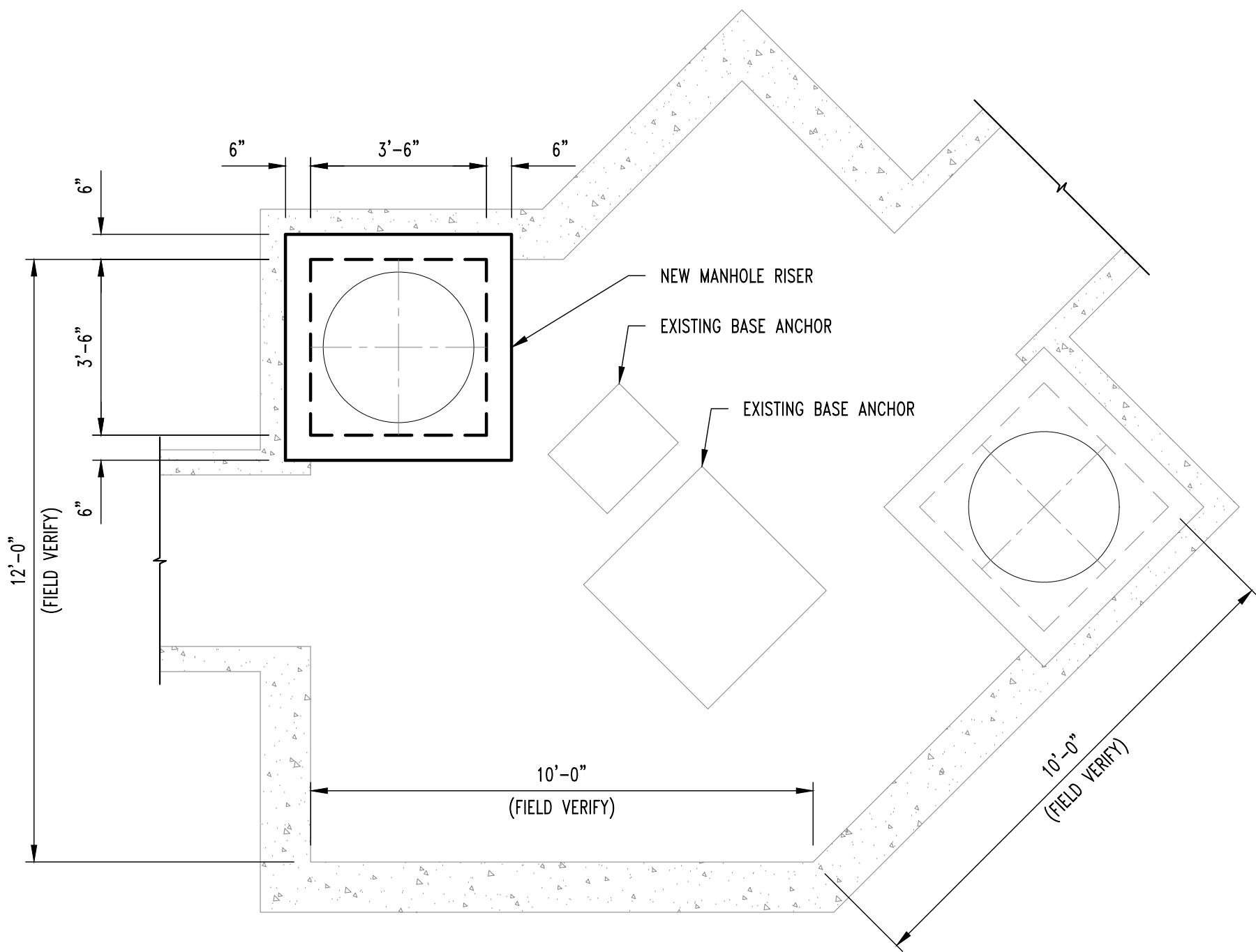
SHEET:

S201

**REPAIR NOTES**

SMH #156 APPROXIMATE REPAIR AREAS

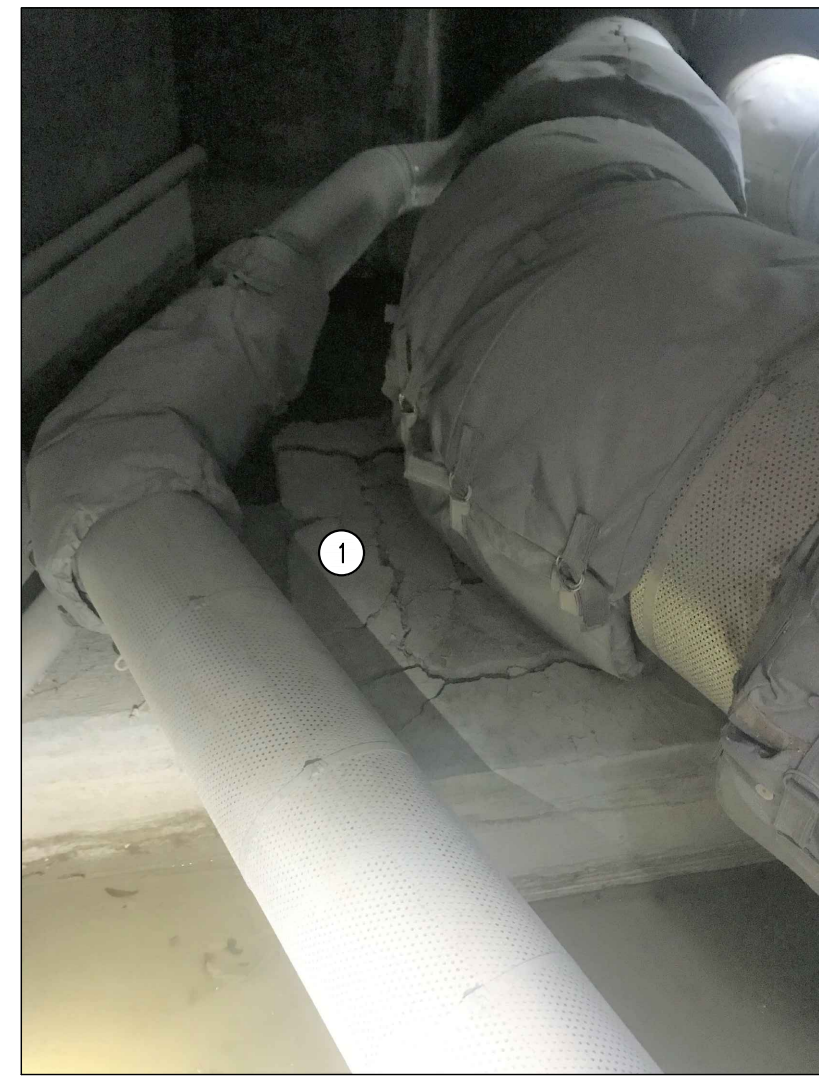
- EXISTING 36" CAST IRON RING TO BE REPLACED.



PLAN VIEW



1 SPALLED CONCRETE, SEE REPAIR NOTE 1.



1 SPALLED CONCRETE, SEE REPAIR NOTE 1.

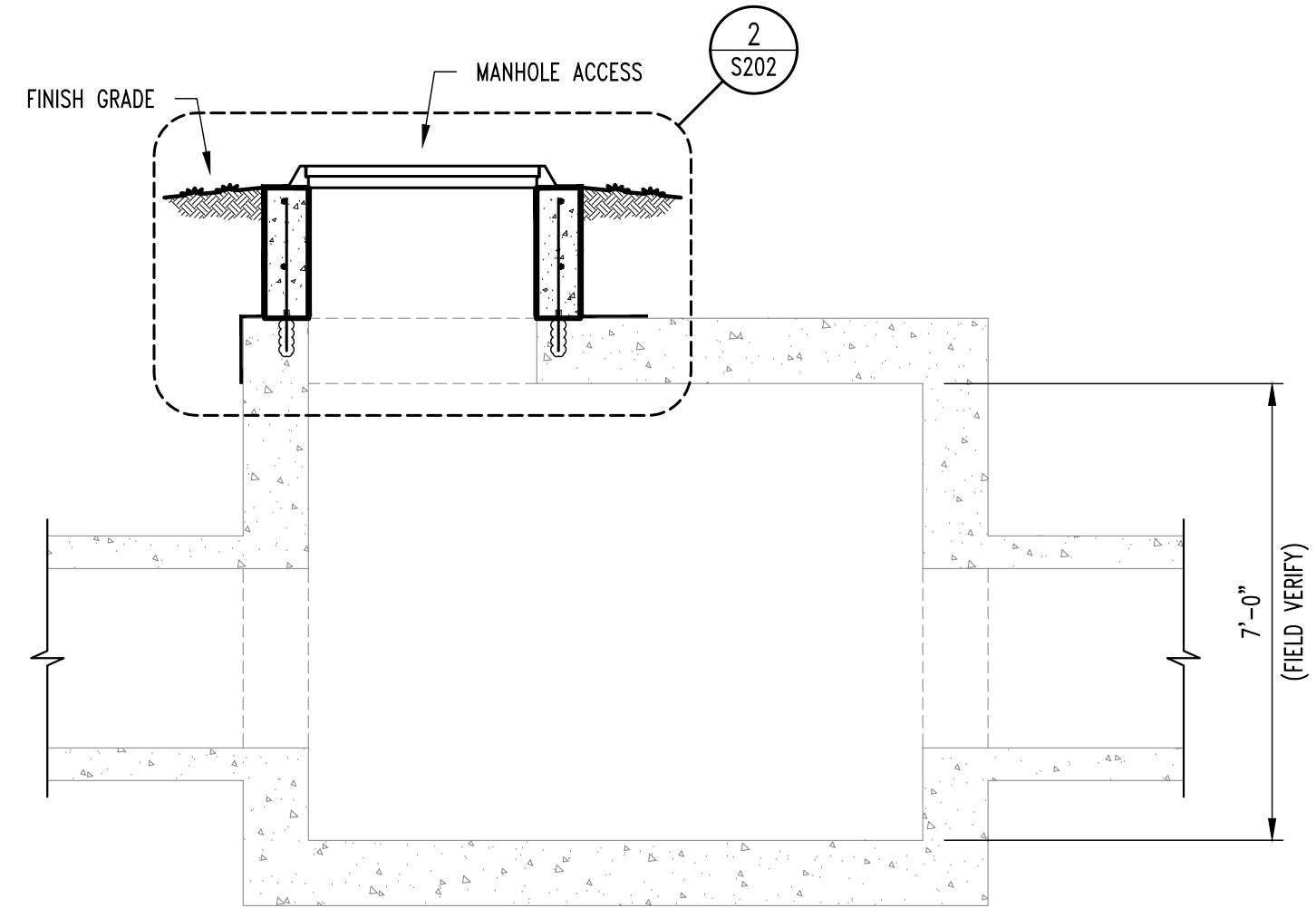


1 DAMAGED BRICK RISER, SEE REPAIR NOTE 3.

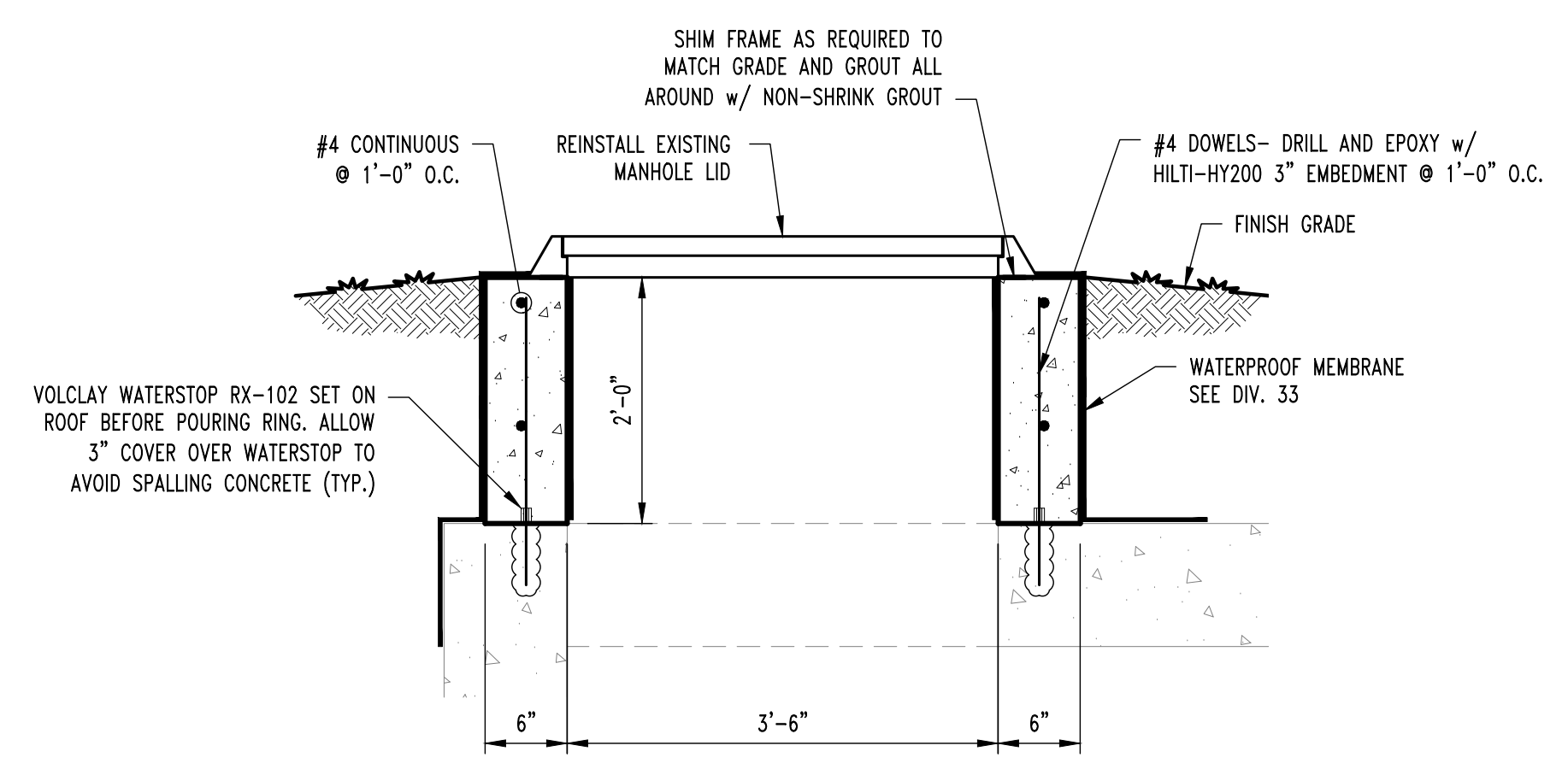
SMH #324 - NORTH OF HOSPITAL

SMH #324 - NORTH OF HOSPITAL

SMH #324 - NORTH OF HOSPITAL



1 STEAM MANHOLE #324  
SCALE: 3/8" = 1'-0"



2 RISER DETAIL  
SCALE: 3/8" = 1'-0"

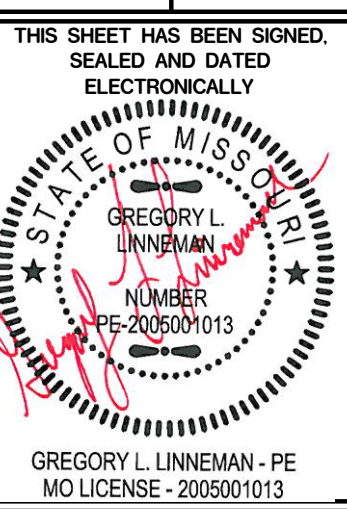
**GENERAL NOTES**

- CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL TEMPORARY COOLING AND VENTILATION AS NEEDED TO PERFORM WORK INSIDE THE MANHOLES AND TUNNEL. COOLING AND VENTILATION WILL BE REQUIRED FOR PORTIONS OF THIS PROJECT.
- ALL CONCRETE PATCHING/REPAIR DETAILS AND NOTES ARE PROVIDED ON SHEET S300.
- ALL REINFORCING TO BE MMFX/CHROME X REBAR.
- ALL DAMAGE TO GALVANIZING TO BE REPAIRED w/ HOT GALVANIZING BY CONTRACTOR.
- ALL EXPOSED STEEL TO BE HOT DIPPED GALVANIZED INCLUDING BOLTS, WASHERS, ETC.

**WATERPROOFING NOTES**

- THE EXISTING MANHOLE WATERPROOFING IS ASSUMED TO BE ACM AND SHALL BE TESTED BY OWNERS REPRESENTATIVE ONCE EXPOSED FOR POSSIBLE ACM MATERIALS. ABATEMENT OF ALL MATERIALS WILL BE BY CONTRACTOR UNDER THIS CONTRACT.
- WATERPROOFING SHOP DRAWINGS SHALL BE PROVIDED PER THE SPECIFICATIONS IN DIVISION 33.
- ALL CONCRETE WATERPROOFING SHALL BE INSPECTED BY THE OWNER PRIOR TO PROCEEDING TO NEXT STEP OF INSTALLATION. OWNER SHALL RECEIVE 24 HOUR NOTICE OF INSPECTIONS BEING REQUIRED. THESE INSPECTIONS FOR APPROVAL INCLUDE:
  - SUBSTRATE CONDITIONS READY FOR WATERPROOFING
  - FLASHING INSTALLATION COMPLETE
  - MEMBRANE INSTALLATION COMPLETE
  - PROTECTION AND DRAINAGE INSTALLATION COMPLETE

No.	Date
BID SET	01/12/2022



STRUCTURAL ENGINEER  
**CROCKETT**  
 ENGINEERING CONSULTANTS  
 1000 W. N. BRIDGES BLVD.  
 COLUMBIA, MISSOURI 65203  
 www.crockettengineering.com  
 Missouri License Authority  
 License No. 0500101301

CLIENT:  
 UNIVERSITY OF MISSOURI  
 225 UNIVERSITY HALL  
 COLUMBIA, MISSOURI 65211

CP220041 - VARIOUS LOCATIONS  
 REPAIR CONCRETE IN STEAM MANHOLES  
 UNIVERSITY OF MISSOURI  
 COLUMBIA, BOONE COUNTY, MISSOURI

DRAWING INCLUDES:

SMH #324  
 PLAN & PHOTOS

DESIGNED: GLL

DRAWN: RCA

PROJECT NO.: 180016

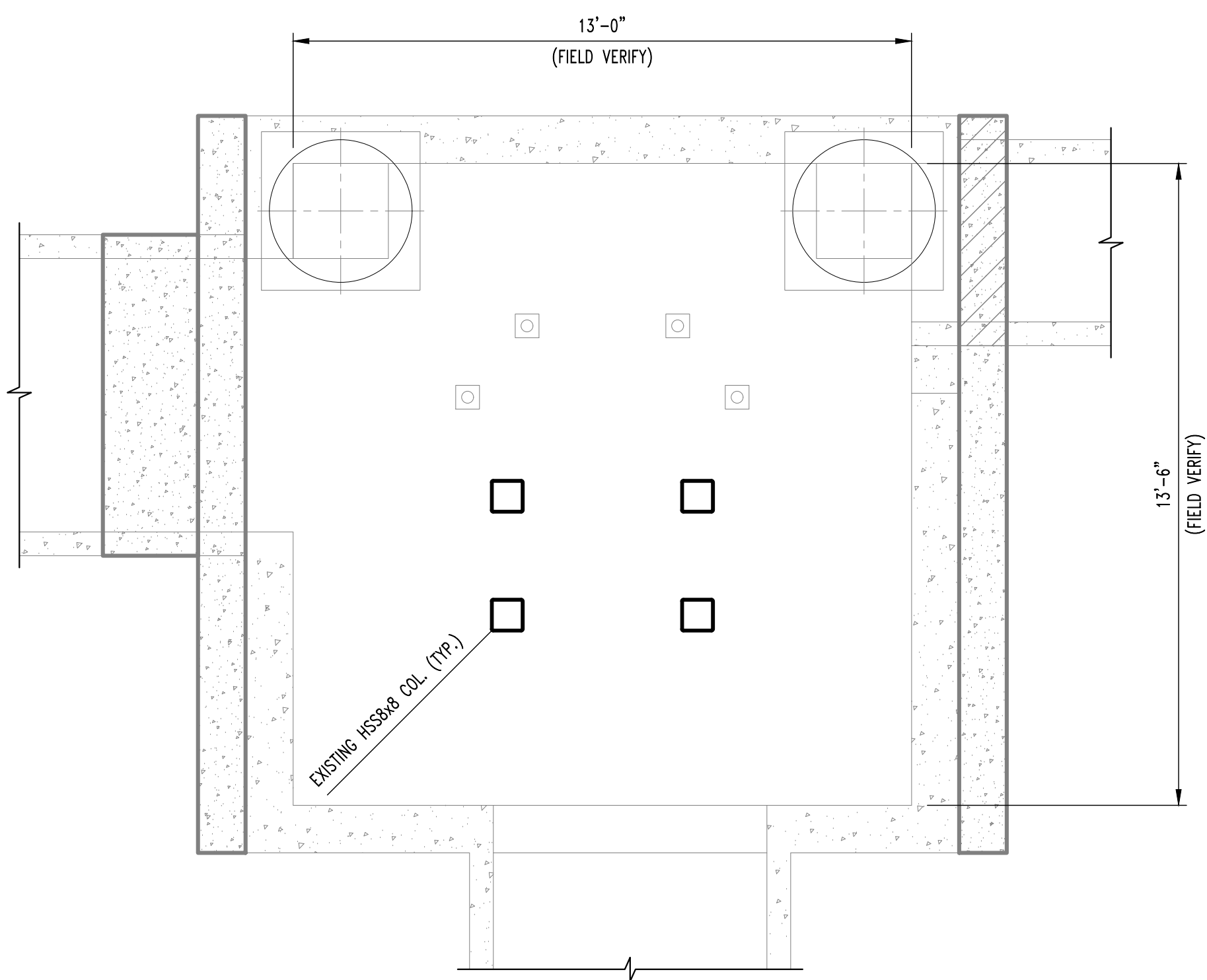
MU PROJECT NO.: CP220041

SHEET:

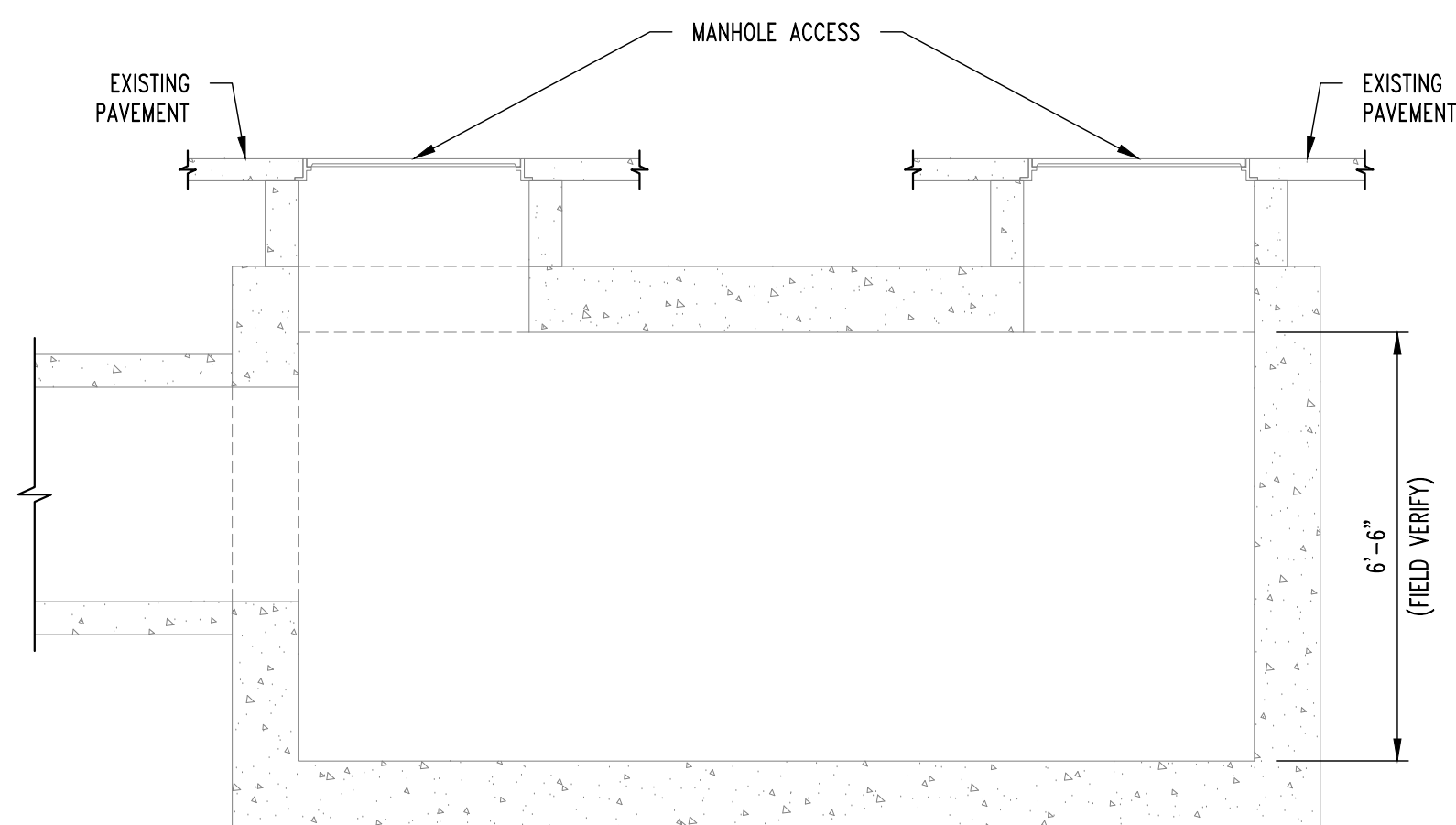
S202

**REPAIR NOTES**

- SMH #324 APPROXIMATE REPAIR AREAS
- THERE IS AN 24 INCH X 20 INCH X 22 INCH TALL ANCHOR w/ 3 INCH DEEP CRACKS ALL AROUND. (REPAIR #3 EXPECTED) CONTRACTOR TO CONTACT EM PRIOR TO REPAIR OF ANCHOR TO COORDINATE UTILITY SHUTDOWN AS NEEDED, STEAM LINES WILL ONLY BE ABLE TO BE SHUT DOWN ONE AT A TIME AND ANCHORS WILL ONLY BE ABLE TO BE REPAIRED ONE AT A TIME.
  - THERE IS AN 40 INCH X 42 INCH X 22 INCH TALL ANCHOR w/ 3 INCH DEEP CRACKS ALL AROUND. (REPAIR #3 EXPECTED) CONTRACTOR TO CONTACT EM PRIOR TO REPAIR OF ANCHOR TO COORDINATE UTILITY SHUTDOWN AS NEEDED.
  - DAMAGED BRICK RISER TO BE REMOVED & REPLACED, REFER TO DETAIL 2/S203.



PLAN VIEW



1  
S203  
STEAM MANHOLE #343  
SCALE: 3/8" = 1'-0"

**REPAIR NOTES**

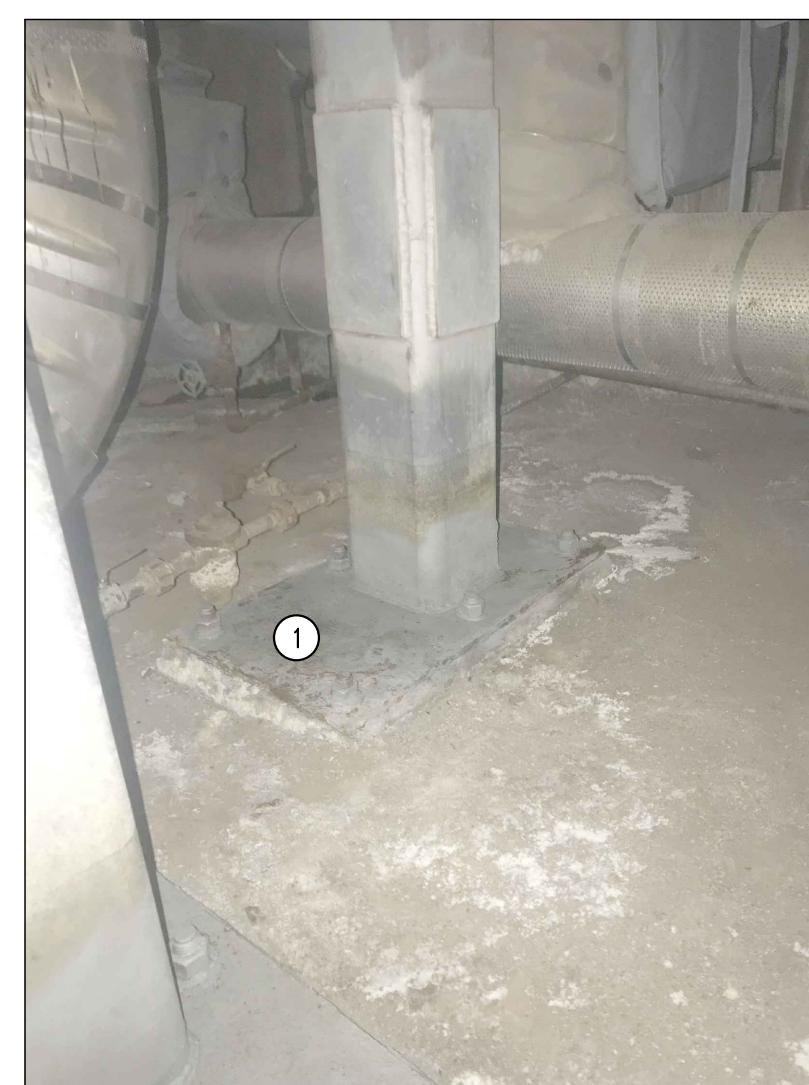
**SMH #343 APPROXIMATE REPAIR AREAS**

- AROUND THE CHASE THERE IS REBAR EXPOSED AND 26"x26" SPALLING X 3 INCH DEEP. (REPAIR #3 EXPECTED)
- (4) EXISTING HSS COLUMNS REQUIRE NEW BASEPLATES. SEE DETAIL 2/S204. PRIOR TO REPAIR, STEAM SYSTEM WILL NEED TO BE SHUT DOWN TO WORK ON THIS ELEMENT, STEAM LINES WILL ONLY BE ABLE TO BE SHUT DOWN ONE AT A TIME AND ANCHORS WILL ONLY BE ABLE TO BE REPLACED ONE AT A TIME. CONTRACTOR SHALL COORDINATE WITH OWNER ONE WEEK IN ADVANCE FOR SYSTEM SHUT DOWN. ADDITIONALLY, NEW EXPANSION ANCHORS INTO LID ARE REQUIRED WHERE ONES HAVE NOT BEEN INSTALLED. USE SAME ANCHORS AS IN BASEPLATE DETAIL. CONTRACTOR PROVIDE VERTICAL PIPE SUPPORT PRIOR TO REPAIR. REMOVE TEMPORARY BRACING ONCE NEW BASE PLATES ARE INSTALLED
- 36" WIDE SPALLING BEHIND LADDER (REPAIR #1 EXPECTED)
- SPALLING AT CONCRETE PATCHED AREAS NEAR BOTH RISERS (REPAIR #1 EXPECTED)
- THERE ARE A TOTAL OF 4 FEET OF CRACKS THAT WILL NEED TO BE EPOXY INJECTED WITH SIKADUR INJECTION GEL OR APPROVED EQUAL.
- 24"x36" SPALLED AREA ON WEST WALL (REPAIR #2 EXPECTED).



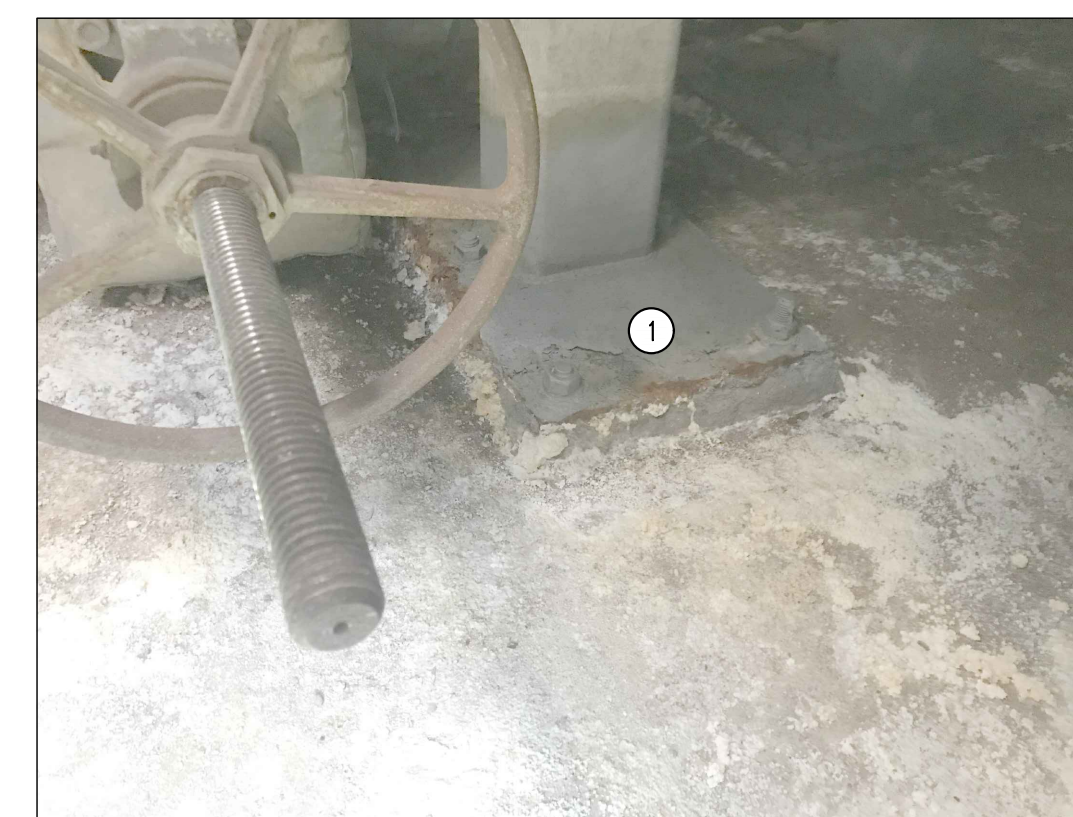
1 DAMAGED BASE PLATE, SEE REPAIR NOTE 2.

**SMH #343 - HOSPITAL DRIVE**



1 DAMAGED BASE PLATE, SEE REPAIR NOTE 2.

**SMH #343 - HOSPITAL DRIVE**



1 DAMAGED BASE PLATE, SEE REPAIR NOTE 2.

**SMH #343 - HOSPITAL DRIVE**



1 SPALLED CONCRETE, SEE REPAIR NOTE 3.

**SMH #343 - HOSPITAL DRIVE**

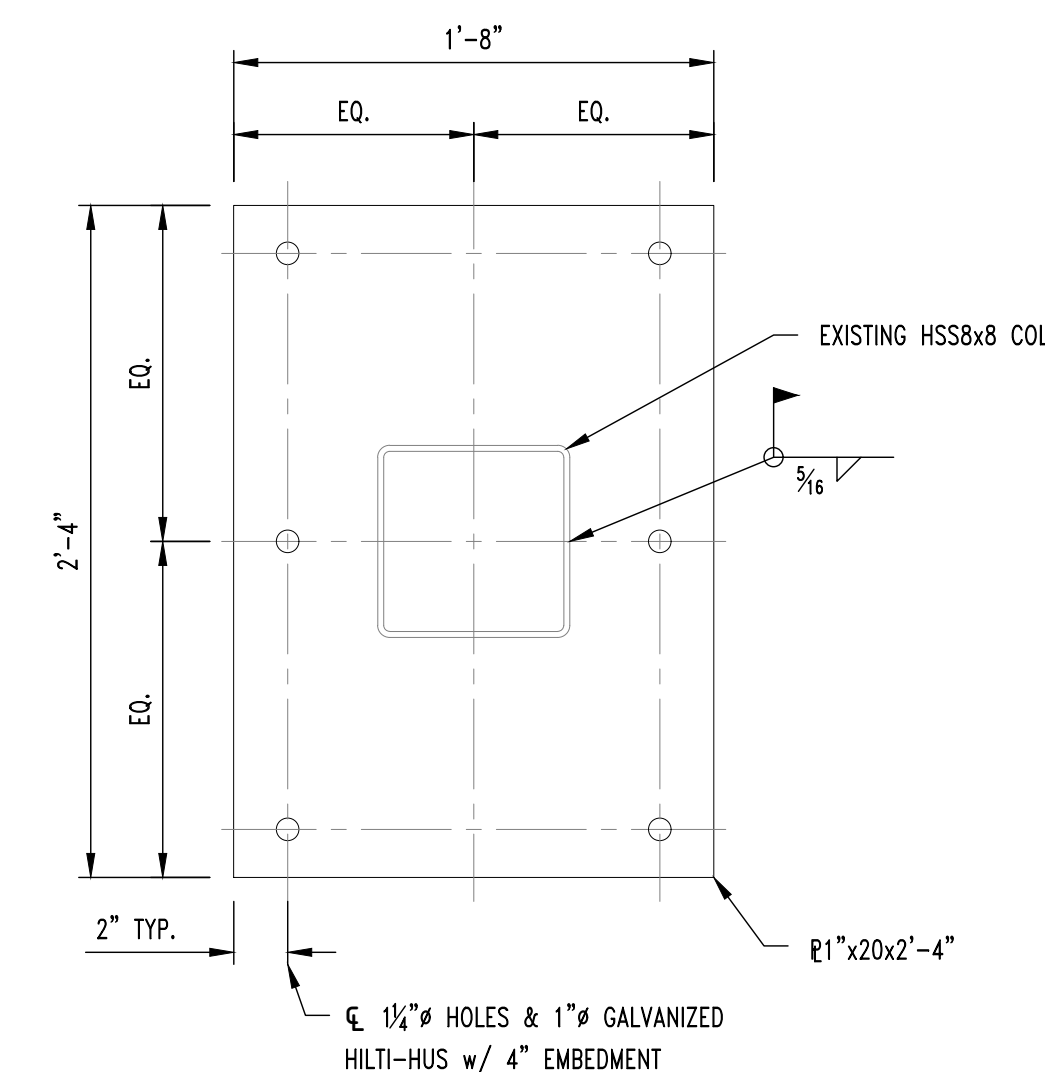


1 SPALLED CONCRETE, SEE REPAIR NOTE 6.

**SMH #343 - HOSPITAL DRIVE**

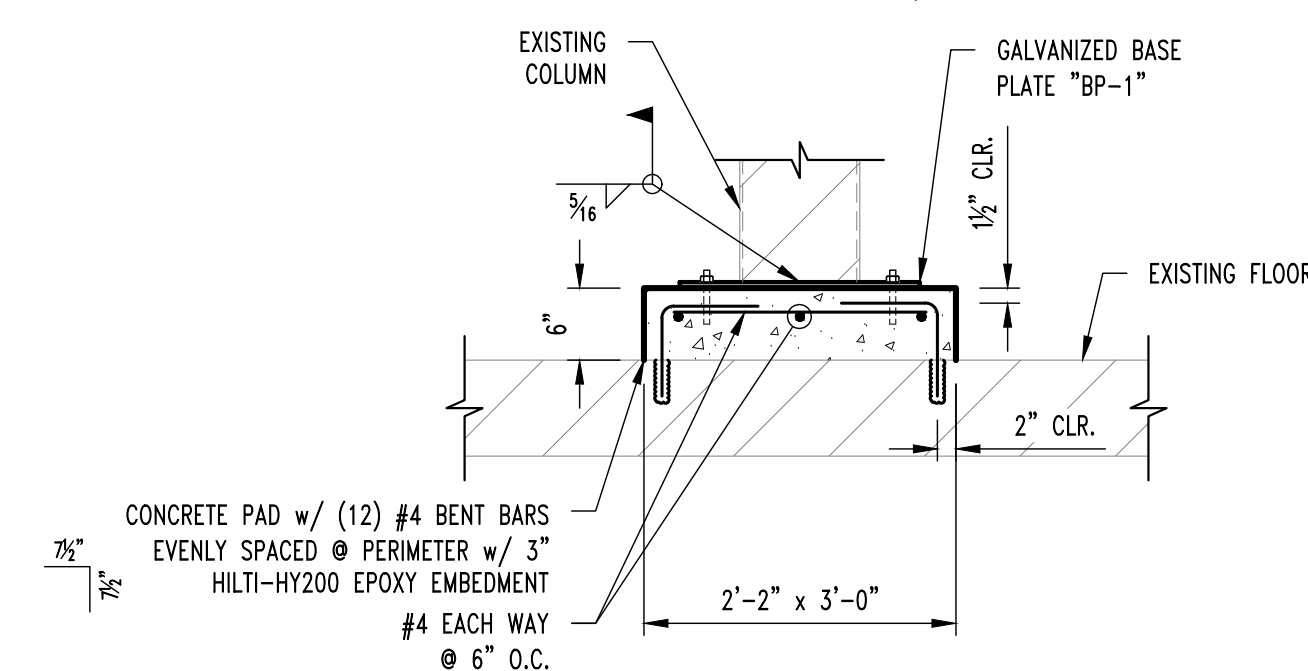
**GENERAL NOTES**

- CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL TEMPORARY COOLING AND VENTILATION AS NEEDED TO PERFORM WORK INSIDE THE MANHOLES AND TUNNEL. COOLING AND VENTILATION WILL BE REQUIRED FOR PORTIONS OF THIS PROJECT.
- ALL CONCRETE PATCHING/REPAIR DETAILS AND NOTES ARE PROVIDED ON SHEET S300.
- ALL REINFORCING TO BE MMFX/CHROME X REBAR.
- ALL DAMAGE TO GALVANIZING TO BE REPAIRED w/ HOT GALVANIZING BY CONTRACTOR.
- ALL EXPOSED STEEL TO BE HOT DIPPED GALVANIZED INCLUDING BOLTS, WASHERS, ETC.



**BASE PLATE "BP-1"**

(FIELD CONFIRM DIMENSIONS PRIOR TO FABRICATION)



**BASE ANCHORAGE DETAIL**

SCALE: 3/8" = 1'-0"

**REVISIONS:**

No.	Date
BID SET	01/12/2022

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY  
 STATE OF MISSOURI  
 GREGORY L LINNEMAN  
 LICENSE NUMBER  
 PE-2005001013  
 MISSOURI PROFESSIONAL ENGINEER  
 GREGORY L LINNEMAN - PE  
 MO LICENSE - 2005001013

STRUCTURAL ENGINEER  
**CROCKETT**  
 ENGINEERS AND ARCHITECTS  
 1000 W. N. BRIDGES BLVD.  
 COLUMBIA, MISSOURI 65203  
 (314) 487-0292  
 www.crockettengineering.com  
 Crockett Engineering Consultants, LLC  
 Missouri License # 2005001013

CLIENT:  
 UNIVERSITY OF MISSOURI  
 225 UNIVERSITY HALL  
 COLUMBIA, MISSOURI 65211

**CP220041 - VARIOUS LOCATIONS  
 REPAIR CONCRETE IN STEAM MANHOLES**  
 UNIVERSITY OF MISSOURI  
 COLUMBIA, BOONE COUNTY, MISSOURI

DRAWING INCLUDES:  
 SMH #343  
 PLAN & PHOTOS

DESIGNED: GLL  
 DRAWN: RCA  
 PROJECT NO.: 180016  
 MU PROJECT NO.: CP220041  
 SHEET:  
 S203

**GENERAL NOTES**

- CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL TEMPORARY COOLING AND VENTILATION AS NEEDED TO PERFORM WORK INSIDE THE MANHOLES AND TUNNEL. COOLING AND VENTILATION WILL BE REQUIRED FOR PORTIONS OF THIS PROJECT.
- ALL CONCRETE PATCHING/REPAIR DETAILS AND NOTES ARE PROVIDED ON SHEET S300.
- ALL REINFORCING TO BE MMFX/CHROME X REBAR.
- ALL DAMAGE TO GALVANIZING TO BE REPAIRED w/ HOT GALVANIZING BY CONTRACTOR.
- ALL EXPOSED STEEL TO BE HOT DIPPED GALVANIZED INCLUDING BOLTS, WASHERS, ETC.

REVISIONS:

No.	Date
BID SET	01/12/2022

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY  
 STATE OF MISSOURI  
 GREGORY L LINNEMAN  
 LICENSE NUMBER  
 PE-2005001013  
 MISSOURI PROFESSIONAL ENGINEER  
 GREGORY L LINNEMAN - PE  
 MO LICENSE - 2005001013

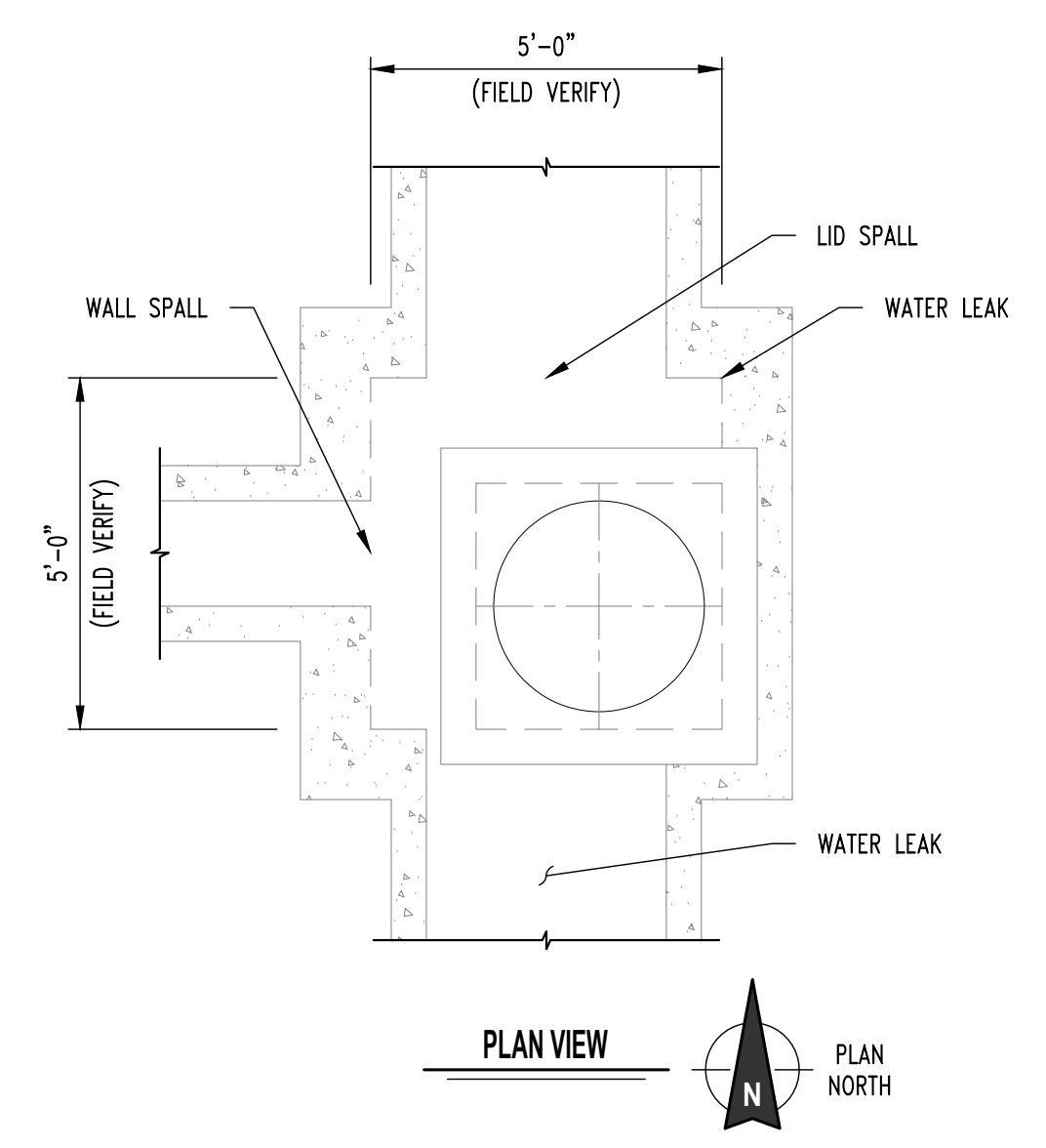
STRUCTURAL ENGINEER  
**CROCKETT**  
 ENGINEERS AND ARCHITECTS  
 1000 W. N. BRIDGES BLVD.  
 COLUMBIA, MISSOURI 65203  
 (314) 447-0292  
 www.crockettengineering.com  
 Crockett Engineering Consultants, LLC  
 Missouri License Authority  
 2005001013

CLIENT:  
 UNIVERSITY OF MISSOURI  
 228 UNIVERSITY HALL  
 COLUMBIA, MISSOURI 65211

CP220041 - VARIOUS LOCATIONS  
 REPAIR CONCRETE IN STEAM MANHOLES  
 UNIVERSITY OF MISSOURI  
 COLUMBIA, BOONE COUNTY, MISSOURI

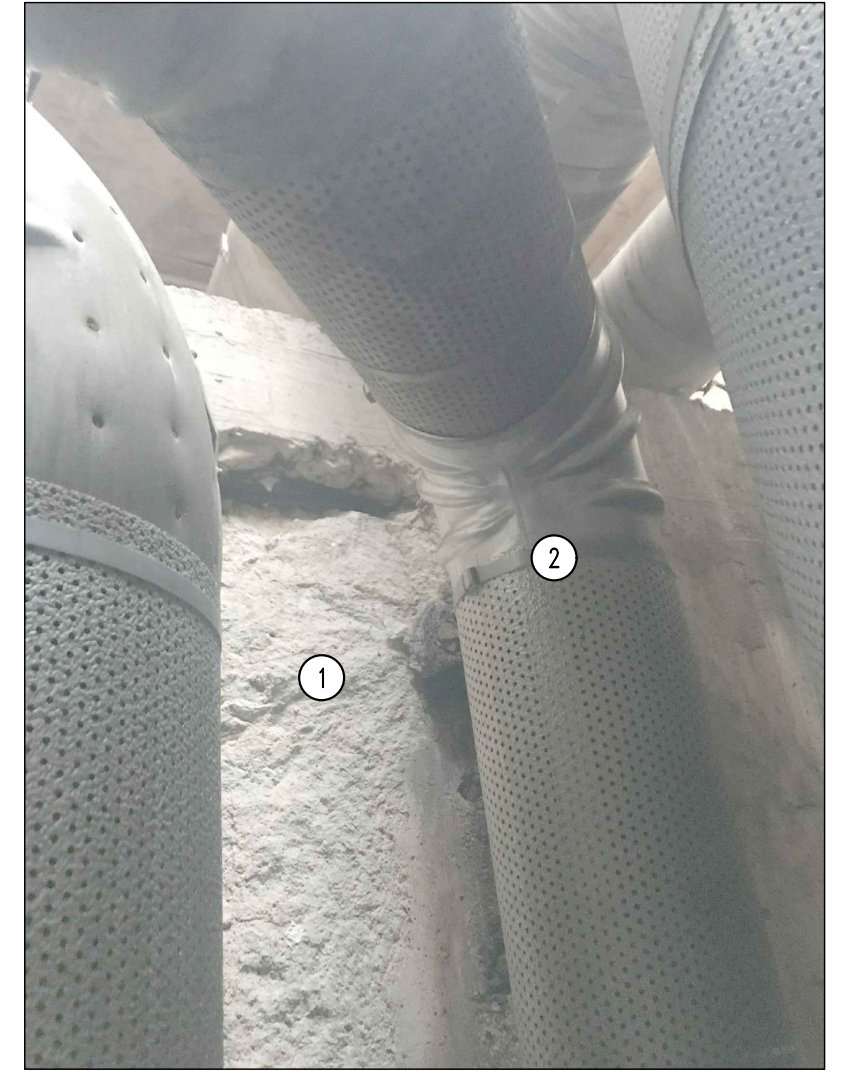
DRAWING INCLUDES:  
 SMH #603  
 PLAN & PHOTOS

DESIGNED: GLL  
 DRAWN: RCA  
 PROJECT NO.: 180016  
 MU PROJECT NO.: CP220041  
 SHEET:  
 S204



- ① SPALLED CONCRETE, SEE REPAIR NOTE 1.
- ② PIPE TO BE REMOVED BY OWNER.

**SMH #603 - GENERAL SERVICES BUILDING**



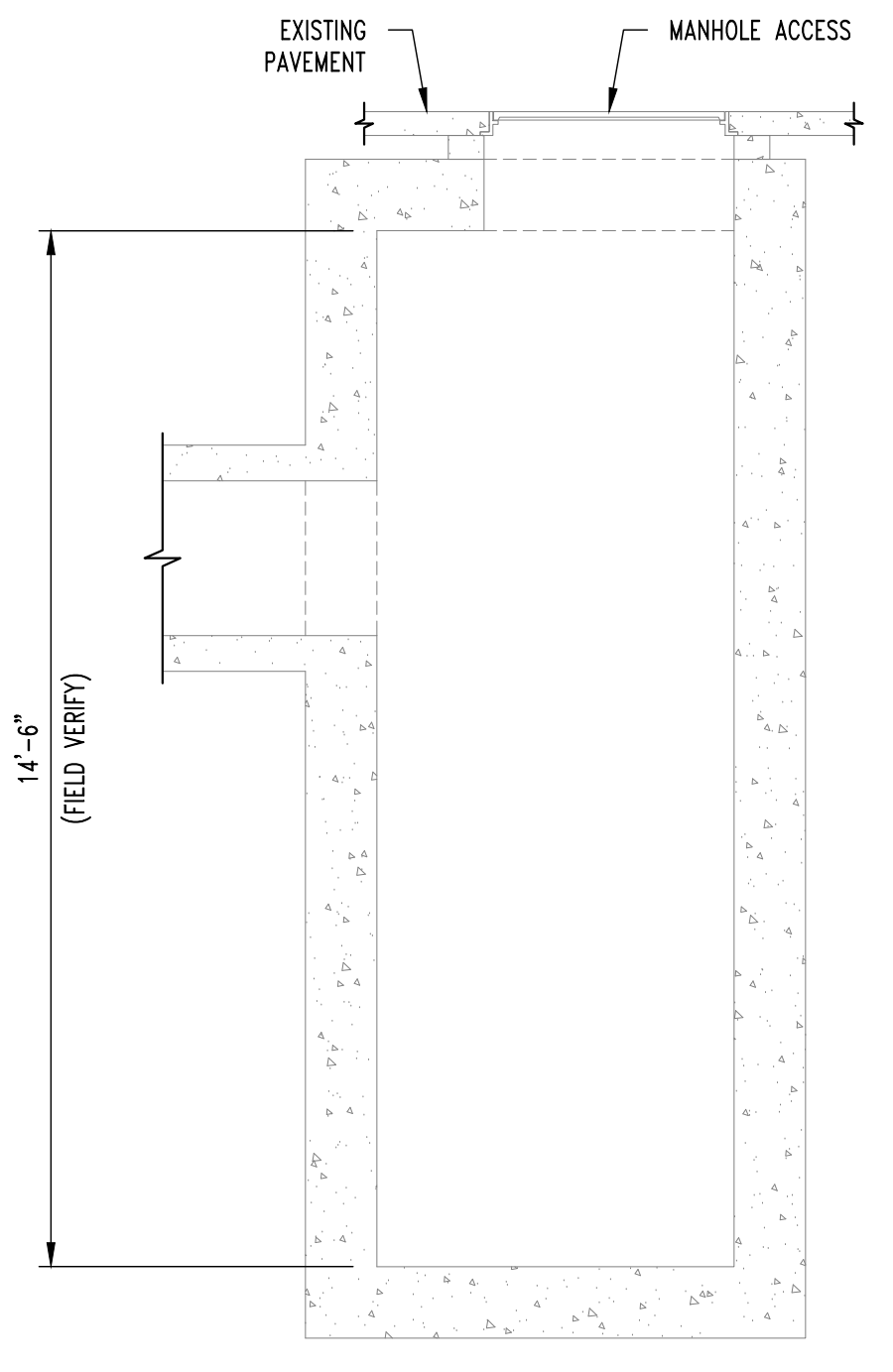
- ① SPALLED CONCRETE, SEE REPAIR NOTE 1.
- ② PIPE TO BE REMOVED BY OWNER.

**SMH #603 - GENERAL SERVICES BUILDING**



- ① WATER LEAK, SEE REPAIR NOTE 3.

**SMH #603 - GENERAL SERVICES BUILDING**



1  
 S204  
**STEAM MANHOLE #603**  
 SCALE: 3/8" = 1'-0"

**SMH #603 NOTES**

- CONTRACTOR SHALL PROVIDE BARRIERS & SIGNAGE COORDINATED w/ MoDOT. SHOULDER CLOSURE SHALL REMAIN IN PLACE UNTIL ALL WORK IS COMPLETED IN HOLE, INCLUDING WORK BY OWNER.
- ONCE STEAM SHUT DOWN HAS BEEN COORDINATED w/ OWNER & COMPLETED, CONTRACTOR SHALL REMOVE ALL LOOSE DEBRIS BEHIND PIPING LOCATED @ WEST WALL.
- OWNER WILL REMOVE TWO PIPES CLOSEST TO WEST WALL TO ALLOW ACCESS TO WEST WALL. ALLOW THREE DAYS FOR THIS WORK.
- CONTRACTOR TO COMPLETE CONCRETE REPAIRS ONCE PIPES REMOVED.
- ONCE COMPLETE w/ REPAIRS OWNER WILL REINSTALL PIPES, ALLOW ONE WEEK FOR THIS WORK.

**REPAIR NOTES**

- SMH #603 APPROXIMATE REPAIR AREAS
- WEST WALL 5'-0" x 5'-0" AREA 3" DEEP, NEW PATCH CAN'T EXTEND PAST FACE OF ORIGINAL CONCRETE DUE TO TIGHT CONDITIONS WITH EXISTING STEAM LINES TO BE REINSTALLED.
  - CORNER OF CHASE TO NORTH 1'-0" x 4'-0" LONG AREA 3" DEEP.
  - (2) SMALL WATER LEAKS SHALL BE INJECTED w/ INJECTABLE WATERSTOP SEAL GUARD II OR PRIOR APPROVED EQUAL.



- ① WATER LEAK, SEE REPAIR NOTE 3.

**SMH #603 - GENERAL SERVICES BUILDING**



- ① SPALLED CONCRETE, SEE REPAIR NOTE 1.
- ② PIPE TO BE REMOVED BY OWNER.

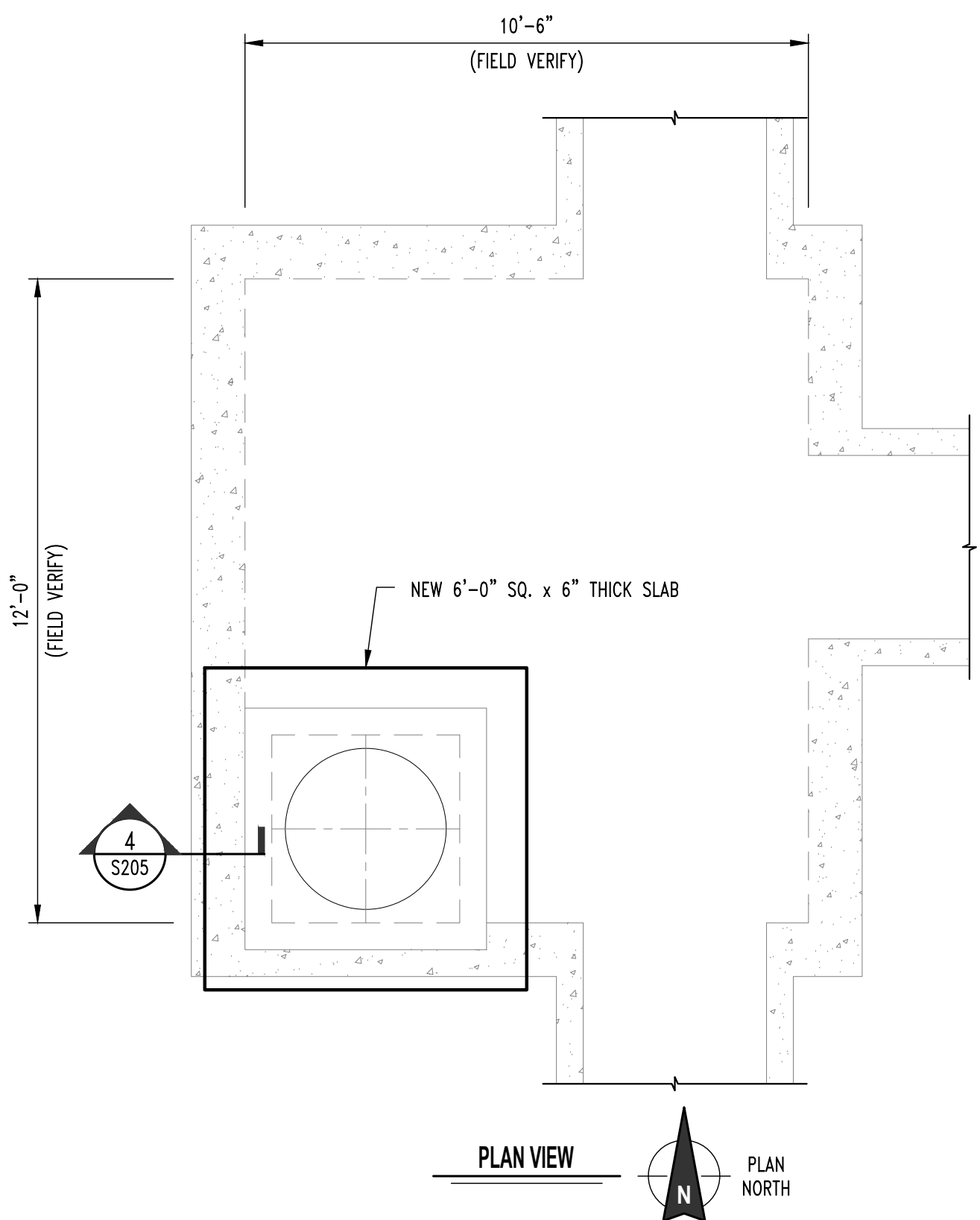
**SMH #603 - GENERAL SERVICES BUILDING**



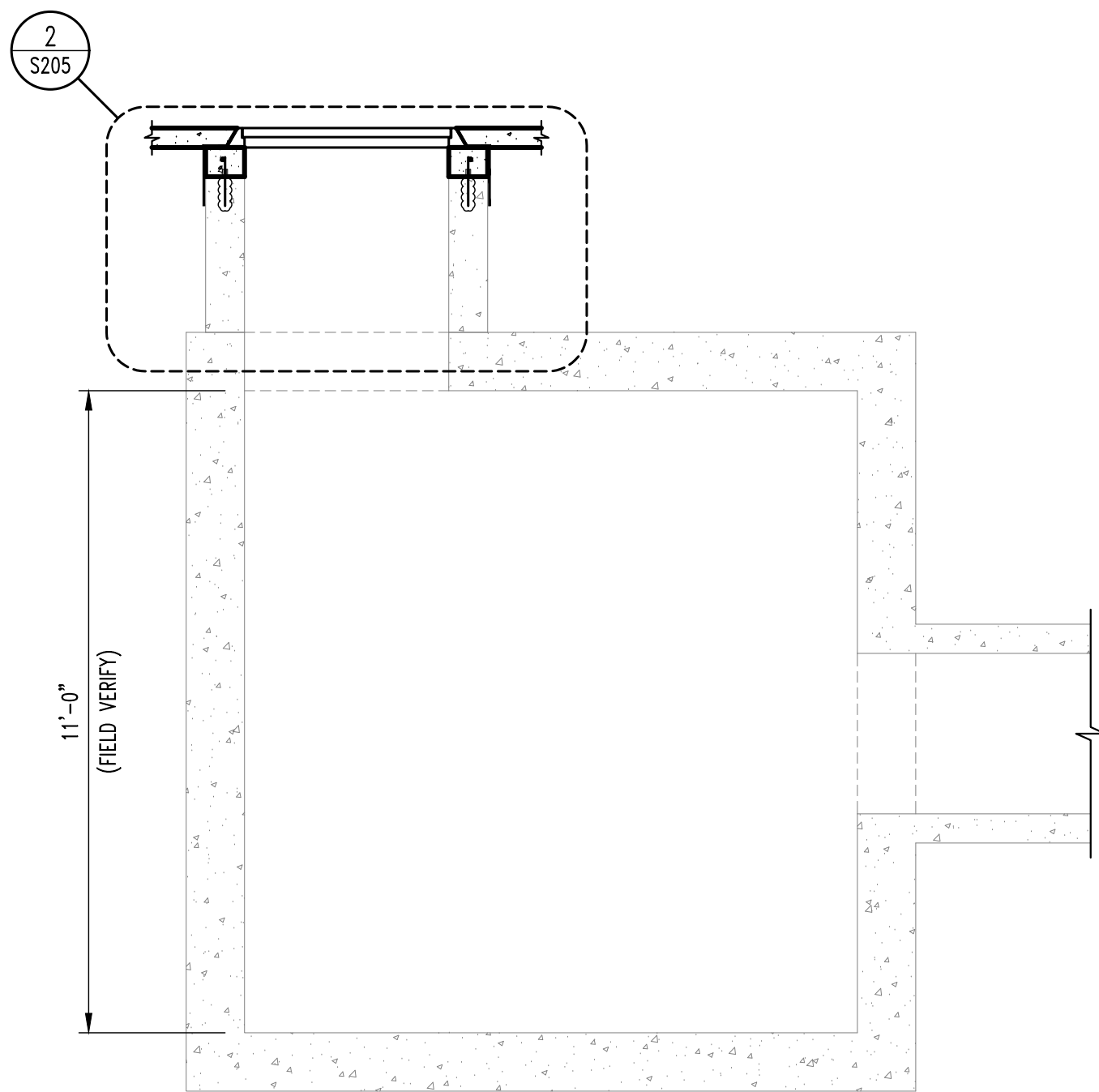
- ① SPALLED CONCRETE, SEE REPAIR NOTE 2.

**SMH #603 - GENERAL SERVICES BUILDING**





PLAN VIEW  
PLAN NORTH



**1** S205  
**STEAM MANHOLE #363 (ALTERNATE #1)**  
SCALE: 3/8" = 1'-0"



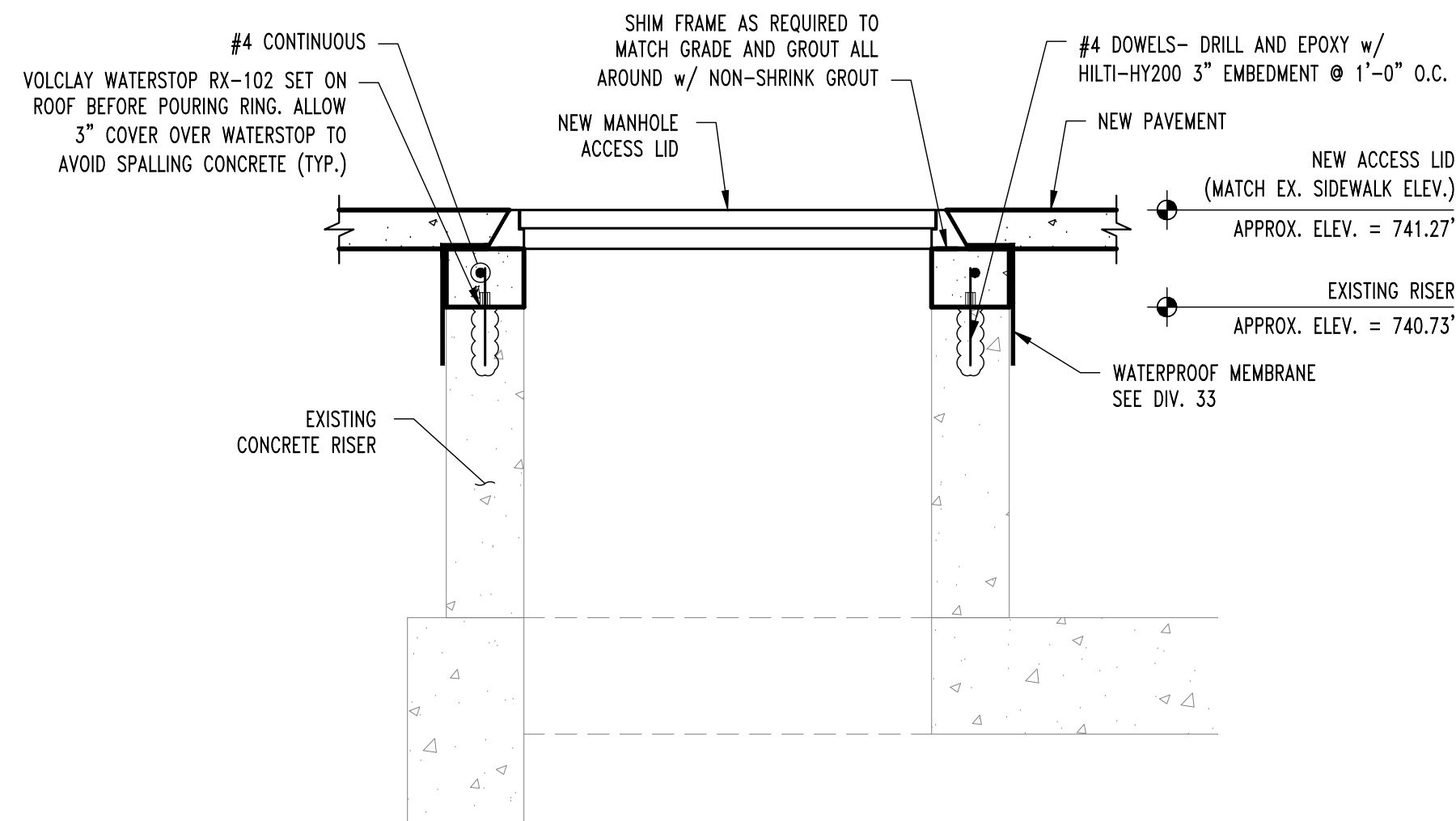
**1** SPALLED CONCRETE, SEE REPAIR NOTE 1.

**SMH #363 - HOSPITAL DRIVE**

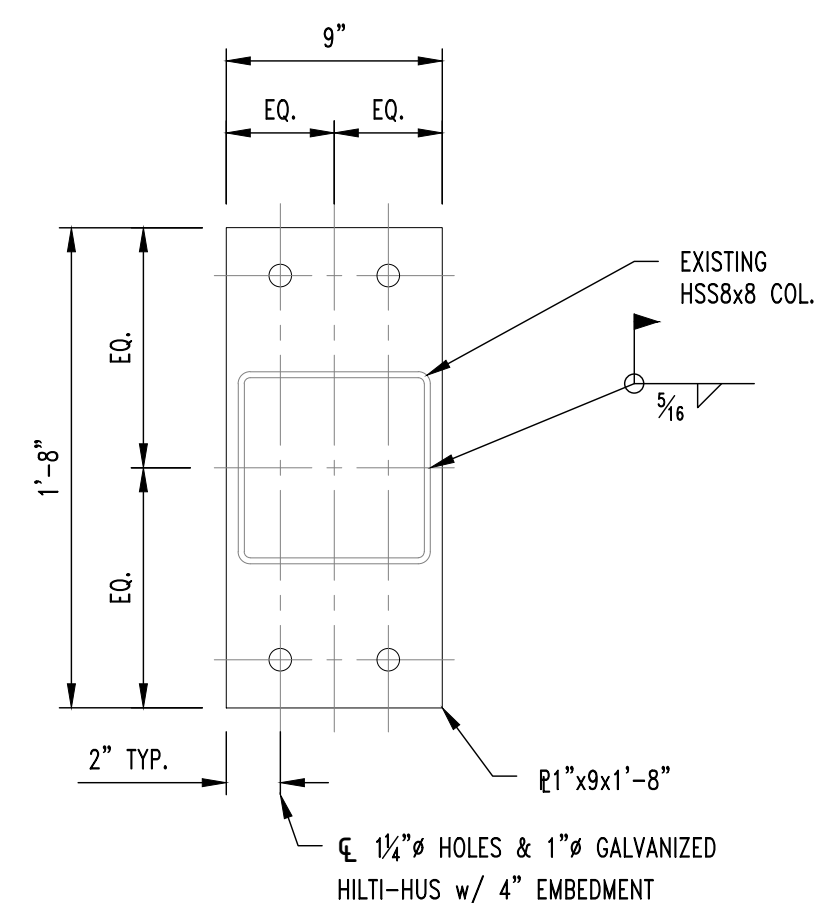


**1** DAMAGED BASE PLATE, SEE REPAIR NOTE 2.

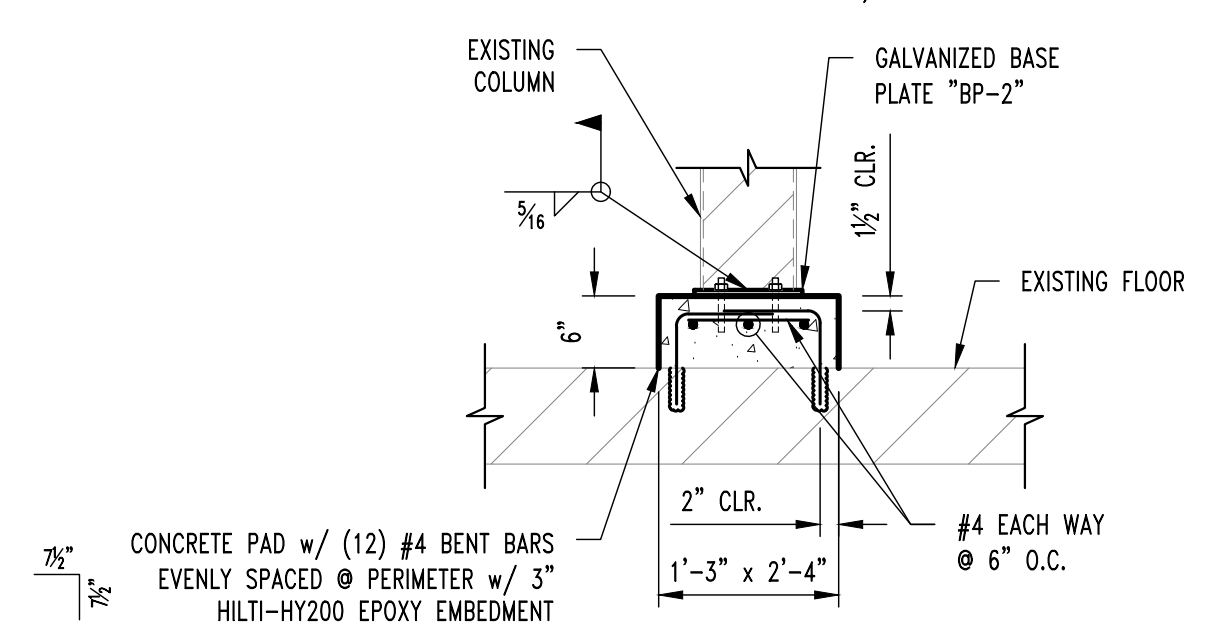
**SMH #363 - HOSPITAL DRIVE**



**2** S205  
**RISER DETAIL**  
SCALE: 3/4" = 1'-0"



**BASE PLATE "BP-2"**  
(FIELD CONFIRM DIMENSIONS PRIOR TO FABRICATION)



**3** S205  
**BASE ANCHORAGE DETAIL**  
SCALE: 3/4" = 1'-0"

**REPAIR NOTES**

**SMH #363 APPROXIMATE REPAIR AREAS**

- BOTH CHASES HAVE SPALLED 6 INCHES THICK X 48 INCHES LONG X 6 INCHES DEEP. (REPAIR #3 EXPECTED)
- (2) EXISTING HSS COLUMNS REQUIRE NEW BASEPLATES. SEE DETAIL 3/S205. PRIOR TO REPAIR, STEAM SYSTEM WILL NEED TO BE SHUT DOWN TO WORK ON THIS ELEMENT, STEAM LINES WILL ONLY BE ABLE TO BE SHUT DOWN ONE AT A TIME AND ANCHORS WILL ONLY BE ABLE TO BE REPLACED ONE AT A TIME. CONTRACTOR SHALL COORDINATE WITH OWNER ONE WEEK IN ADVANCE FOR SYSTEM SHUT DOWN. ADDITIONALLY, NEW EXPANSION ANCHORS INTO LID ARE REQUIRED WHERE ONES HAVE NOT BEEN INSTALLED. USE SAME ANCHORS AS IN BASEPLATE DETAIL. CONTRACTOR PROVIDE VERTICAL PIPE SUPPORT PRIOR TO REPAIR. REPAIR DELAMINATION BEHIND LADDER.
- THERE ARE A TOTAL OF 4 FEET OF CRACKS THAT WILL NEED TO BE EPOXY INJECTED WITH SIKADUR INJECTION GEL OR APPROVED EQUAL.

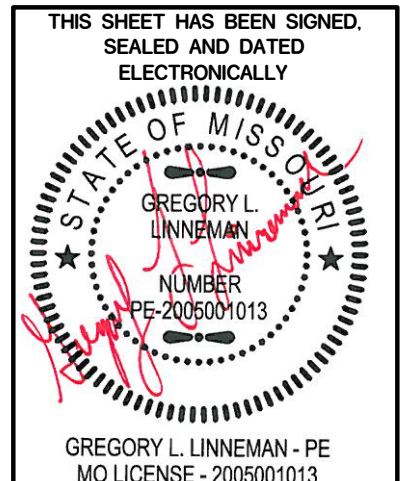
**GENERAL NOTES**

- CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL TEMPORARY COOLING AND VENTILATION AS NEEDED TO PERFORM WORK INSIDE THE MANHOLES AND TUNNEL. COOLING AND VENTILATION WILL BE REQUIRED FOR PORTIONS OF THIS PROJECT.
- ALL CONCRETE PATCHING/REPAIR DETAILS AND NOTES ARE PROVIDED ON SHEET S300.
- ALL REINFORCING TO BE MMFX/CHROME X REBAR.
- ALL DAMAGE TO GALVANIZING TO BE REPAIRED w/ HOT GALVANIZING BY CONTRACTOR.
- ALL EXPOSED STEEL TO BE HOT DIPPED GALVANIZED INCLUDING BOLTS, WASHERS, ETC.

**WATERPROOFING NOTES**

- THE EXISTING MANHOLE WATERPROOFING IS ASSUMED TO BE ACM AND SHALL BE TESTED BY OWNERS REPRESENTATIVE ONCE EXPOSED FOR POSSIBLE ACM MATERIALS. ABATEMENT OF ALL MATERIALS WILL BE BY CONTRACTOR UNDER THIS CONTRACT.
- WATERPROOFING SHOP DRAWINGS SHALL BE PROVIDED PER THE SPECIFICATIONS IN DIVISION 33.
- ALL CONCRETE WATERPROOFING SHALL INSPECTED BY THE OWNER PRIOR TO PROCEEDING TO NEXT STEP OF INSTALLATION. OWNER SHALL RECEIVE 24 HOUR NOTICE OF INSPECTIONS BEING REQUIRED. THESE INSPECTIONS FOR APPROVAL INCLUDE:
  - SUBSTRATE CONDITIONS READY FOR WATERPROOFING
  - FLASHING INSTALLATION COMPLETE
  - MEMBRANE INSTALLATION COMPLETE
  - PROTECTION AND DRAINAGE INSTALLATION COMPLETE

REVISIONS:	
No.	Date
BID SET	01/12/2022



STRUCTURAL ENGINEER  
**CROCKETT**  
ENGINEERING CONSULTANTS  
1000 W. MISSOURI DR. #100  
COLUMBIA, MISSOURI 65203  
www.crockettengineering.com  
Crockett Engineering Consultants, LLC  
Missouri License # 2005001013

CLIENT:  
**UNIVERSITY OF MISSOURI**  
225 UNIVERSITY HALL  
COLUMBIA, MISSOURI 65211

**CP220041 - VARIOUS LOCATIONS  
REPAIR CONCRETE IN STEAM MANHOLES**  
**UNIVERSITY OF MISSOURI  
COLUMBIA, BOONE COUNTY, MISSOURI**

DRAWING INCLUDES:  
  
SMH #363  
(ALTERNATE #1)  
PLAN & PHOTOS

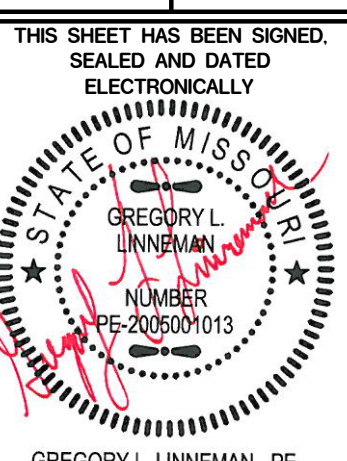
DESIGNED:	GLL
DRAWN:	RCA
PROJECT NO.:	180016
MU PROJECT NO.:	CP220041
SHEET:	S205

**GENERAL NOTES**

1. CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL TEMPORARY COOLING AND VENTILATION AS NEEDED TO PERFORM WORK INSIDE THE MANHOLES AND TUNNEL. COOLING AND VENTILATION WILL BE REQUIRED FOR PORTIONS OF THIS PROJECT.
2. ALL CONCRETE PATCHING/REPAIR DETAILS AND NOTES ARE PROVIDED ON SHEET S300.
3. ALL REINFORCING TO BE MMFX/CHROME X REBAR.
4. ALL DAMAGE TO GALVANIZING TO BE REPAIRED w/ HOT GALVANIZING BY CONTRACTOR.
5. ALL EXPOSED STEEL TO BE HOT DIPPED GALVANIZED INCLUDING BOLTS, WASHERS, ETC.

REVISIONS:

No.	Date
BID SET	01/12/2022



GREGORY L. LINNEHAN - PE  
MO LICENSE - 2005001013

**CROCKETT**  
STRUCTURAL ENGINEER  
ENGINEERING CONSULTANTS  
1000 W. MISSOURI DRIVE  
COLUMBIA, MISSOURI 65203  
(314) 447-0292  
www.crockettengineering.com  
Crockett Engineering Consultants, LLC  
Missouri License Authority  
2005001013

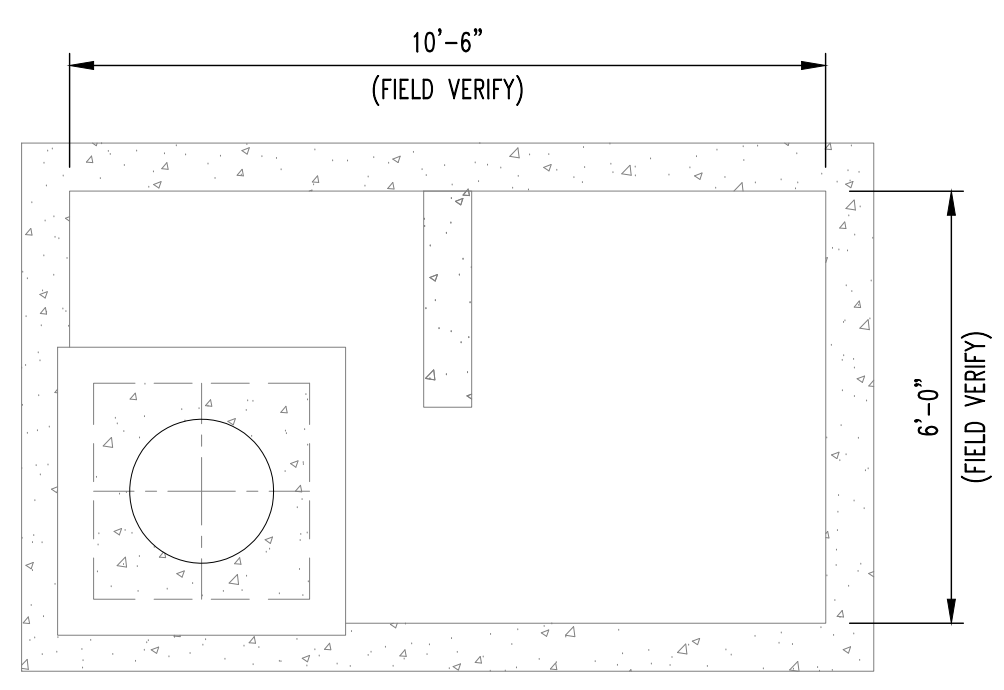
CLIENT:  
**UNIVERSITY OF MISSOURI**  
225 UNIVERSITY HALL  
COLUMBIA, MISSOURI 65211

**CP220041 - VARIOUS LOCATIONS  
REPAIR CONCRETE IN STEAM MANHOLES**

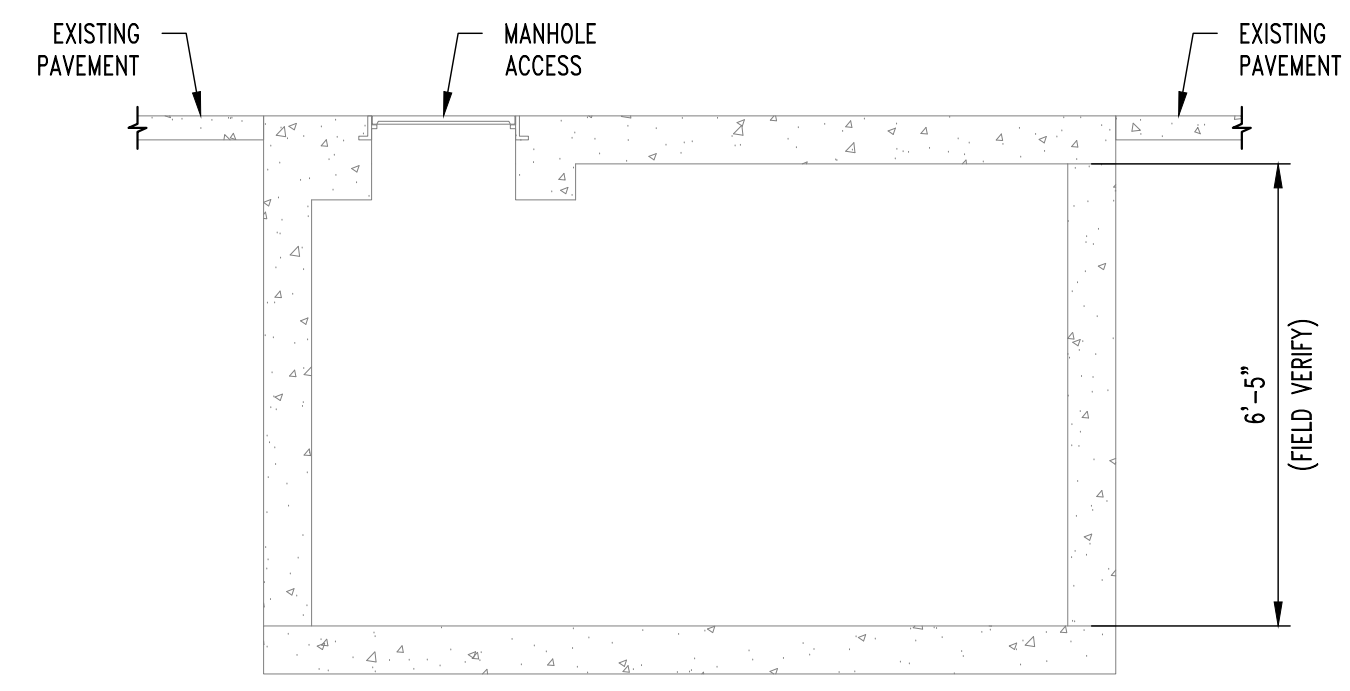
**UNIVERSITY OF MISSOURI  
COLUMBIA, BOONE COUNTY, MISSOURI**

DRAWING INCLUDES:  
SMH #004 (ALTERNATE #2) PLAN & PHOTOS

DESIGNED: GLL  
DRAWN: RCA  
PROJECT NO.: 180016  
MU PROJECT NO.: CP220041  
SHEET: S206



PLAN VIEW



**1** **STEAM MANHOLE #004 (ALTERNATE #2)**  
SCALE: 3/8" = 1'-0"



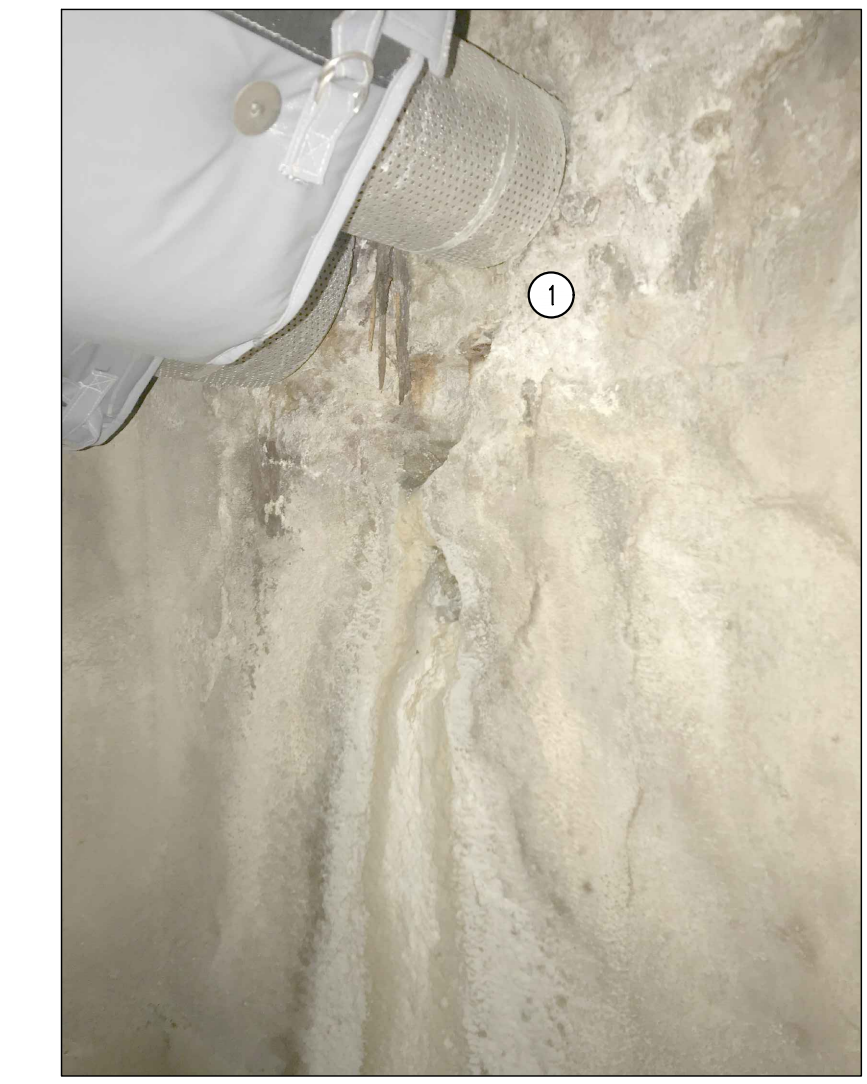
- 1 CAP PLATE DAMAGE, SEE REPAIR NOTE 4.
- 2 EXPOSED REBAR, SEE REPAIR NOTE 1.

**SMH #004 - S 5th St**



- 1 SPALLING, SEE REPAIR NOTE 2.

**SMH #004 - S 5th St**



- 1 SPALLING, SEE REPAIR NOTE 2.

**SMH #004 - S 5th St**



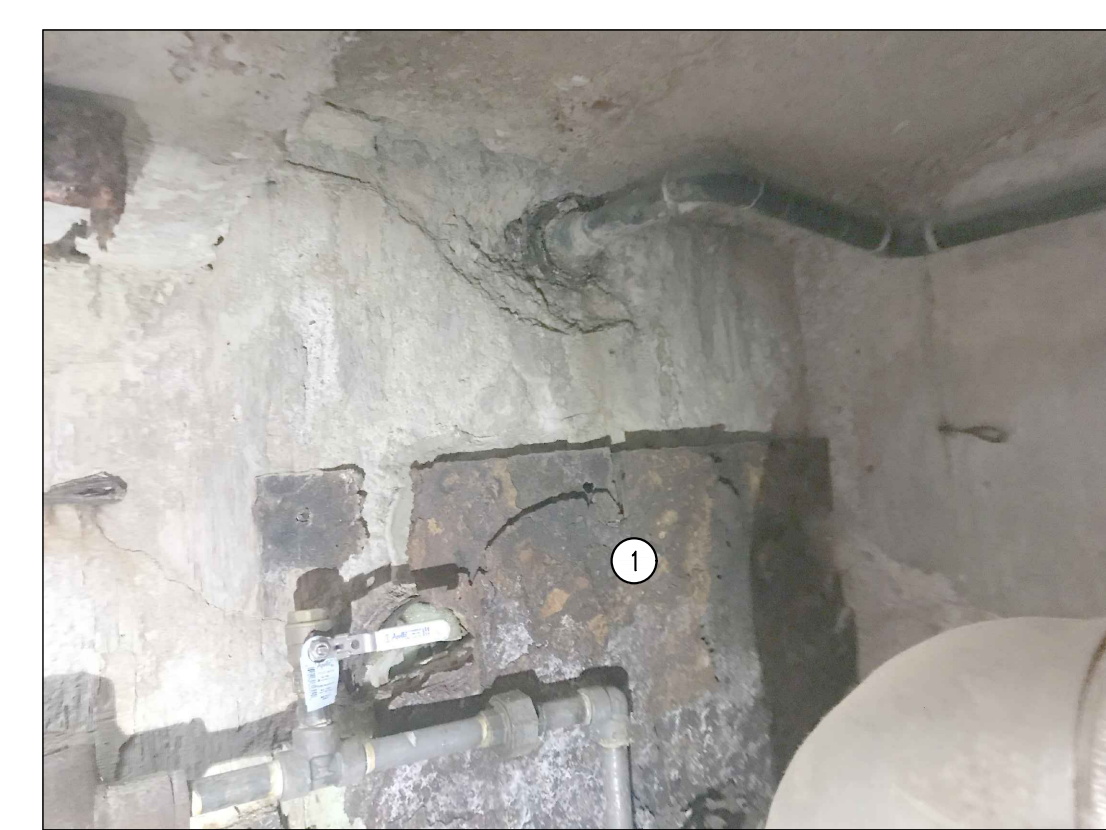
- 1 SPALLED LID, SEE REPAIR NOTE 1.

**SMH #004 - S 5th St**



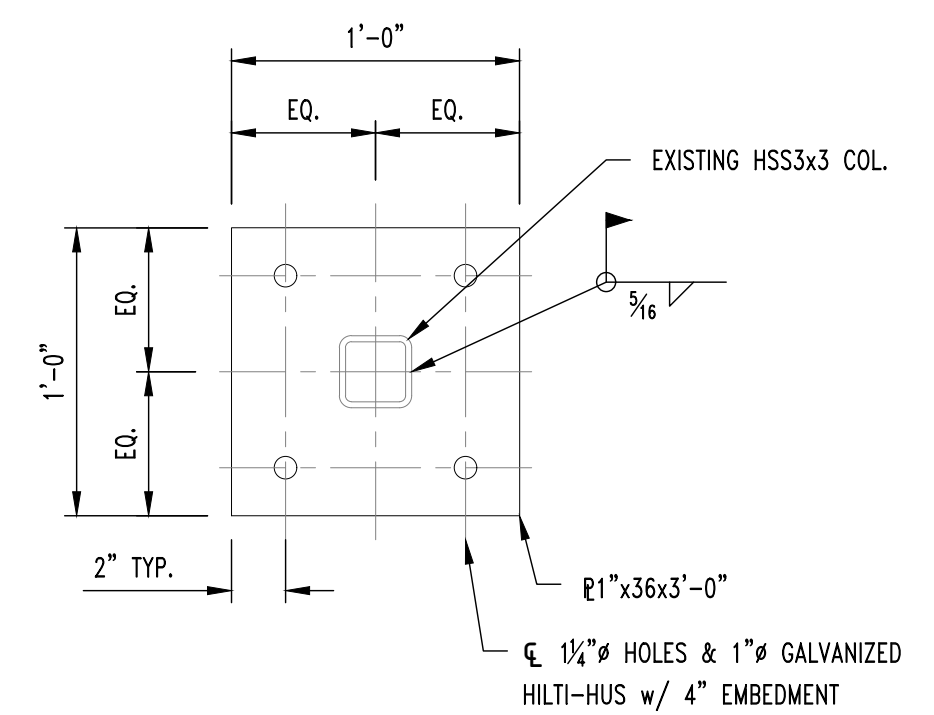
- 1 EXPOSED REBAR, SEE REPAIR NOTE 3.

**SMH #004 - S 5th St**

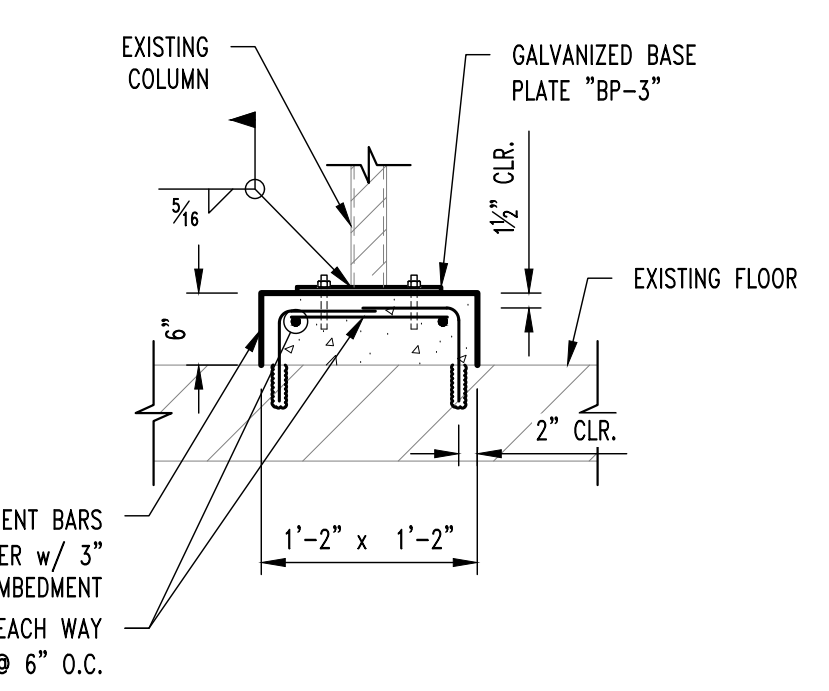


- 1 STEEL PLATE, SEE REPAIR NOTE 6.

**SMH #004 - S 5th St**



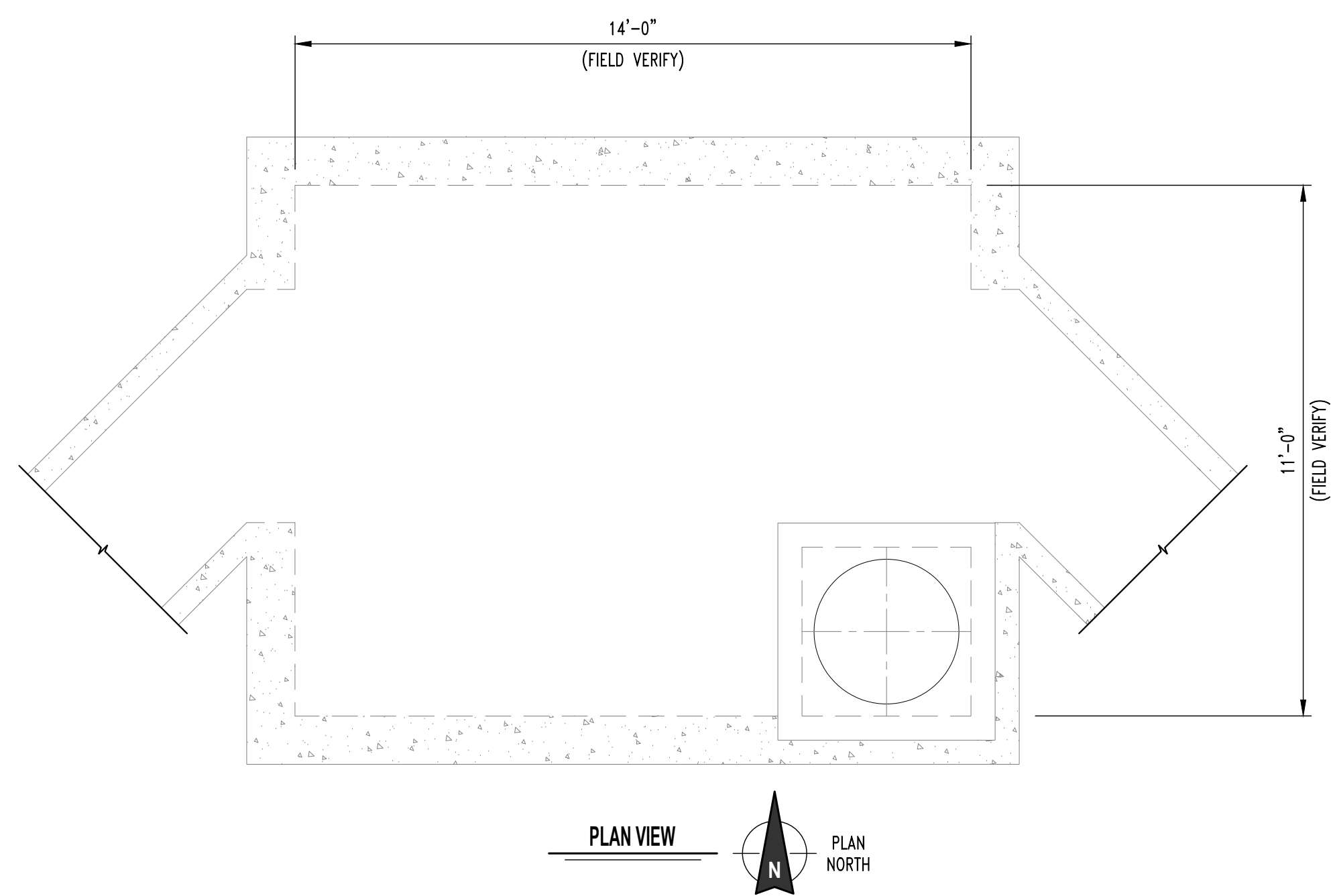
**BASE PLATE "BP-3"**  
(FIELD CONFIRM DIMENSIONS PRIOR TO FABRICATION)



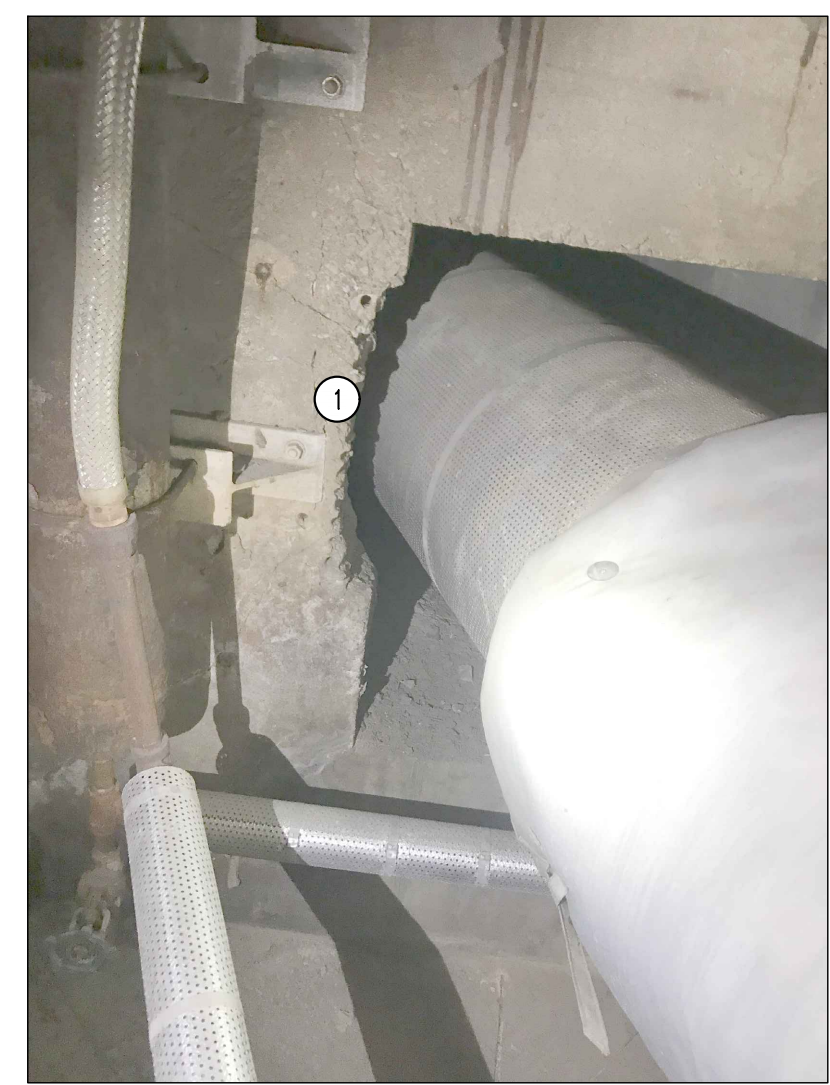
**2** **BASE ANCHORAGE DETAIL**  
SCALE: 3/4" = 1'-0"

**REPAIR NOTES**

- SMH #004 APPROXIMATE REPAIR AREAS**
1. IN THE LID THERE IS REBAR EXPOSED, APPROX. 2'-0" x 4'-0". (REPAIR #3 EXPECTED)
  2. CONCRETE AROUND PIPE PENETRATIONS (2 TOTAL) IN THE NORTH AND EAST WALL, 6" @ PERIMETER (REPAIR #2 EXPECTED)
  3. SPALLING AT AND AROUND LID, 12" ALL SIDES (REPAIR #3 EXPECTED)
  4. SPALLED CONCRETE AT EXISTING CAP PLATE (36"x36") (EXPECT REPAIR #2), REPAIR CAP PLATE & BASE PLATE SEE "BP-3" @ DETAIL 2/S206. COORDINATE STEAM SHUT DOWN WITH OWNER PRIOR TO REPAIR.
  5. 6"x24" SPALL REPAIR AT CENTER WALL, (REPAIR #3 EXPECTED)
  6. 24"x24" STEEL PLATE AT SOUTH WALL TO BE REMOVED AND CONCRETE REPAIRED, (FULL DEPTH REPAIR EXPECTED)



PLAN VIEW  
PLAN NORTH



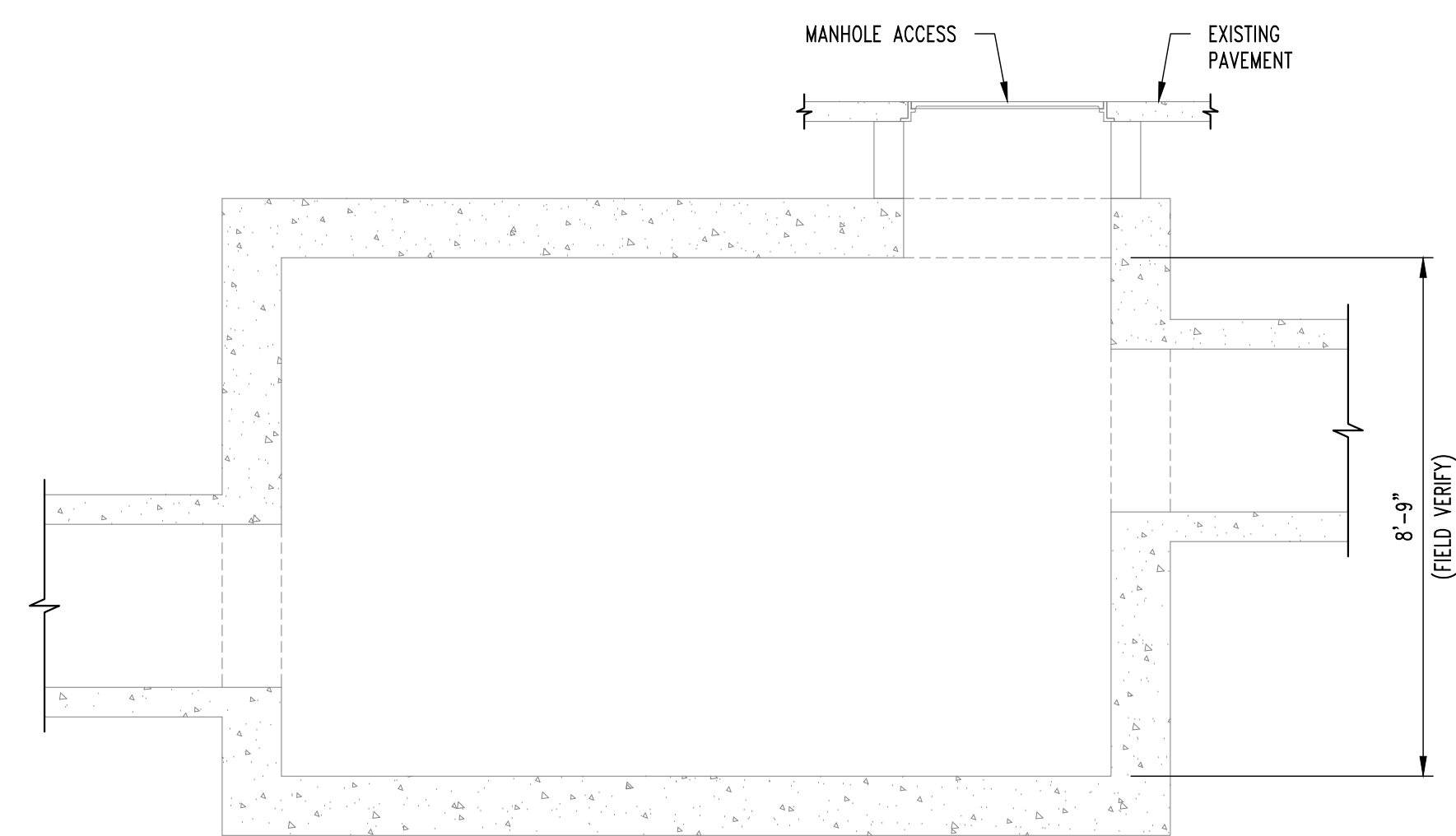
① SPALLED CONCRETE, SEE REPAIR NOTE 2.

**SMH #634 - WARREN HEARNES CENTER**

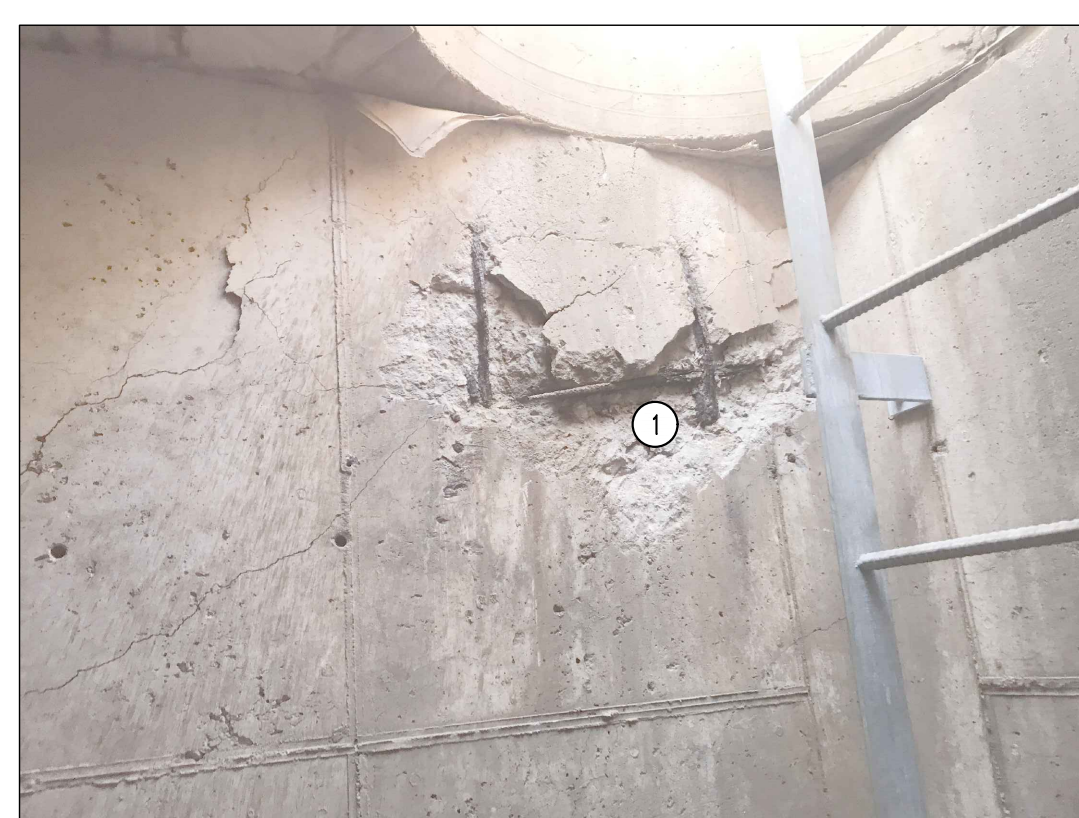


① SPALLED CONCRETE, SEE REPAIR NOTE 2.

**SMH #634 - WARREN HEARNES CENTER**



①  
S207  
**STEAM MANHOLE #634 (ALTERNATE #3)**  
SCALE: 3/8" = 1'-0"



① SPALLED CONCRETE, SEE REPAIR NOTE 1.

**SMH #634 - WARREN HEARNES CENTER**

**GENERAL NOTES**

- CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL TEMPORARY COOLING AND VENTILATION AS NEEDED TO PERFORM WORK INSIDE THE MANHOLES AND TUNNEL. COOLING AND VENTILATION WILL BE REQUIRED FOR PORTIONS OF THIS PROJECT.
- ALL CONCRETE PATCHING/REPAIR DETAILS AND NOTES ARE PROVIDED ON SHEET S300.
- ALL REINFORCING TO BE MMFX/CHROME X REBAR.
- ALL DAMAGE TO GALVANIZING TO BE REPAIRED w/ HOT GALVANIZING BY CONTRACTOR.
- ALL EXPOSED STEEL TO BE HOT DIPPED GALVANIZED INCLUDING BOLTS, WASHERS, ETC.

REVISIONS:

No.	Date
BID SET	01/12/2022

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY  
 STATE OF MISSOURI  
 GREGORY L LINNEMAN  
 LICENSE NUMBER  
 PE-2005001013  
 MISSOURI PROFESSIONAL ENGINEER  
 GREGORY L LINNEMAN - PE  
 MO LICENSE - 2005001013

STRUCTURAL ENGINEER  
**CROCKETT**  
 ENGINEERS AND ARCHITECTS  
 1000 W. MISSOURI DRIVE  
 COLUMBIA, MISSOURI 65203  
 (314) 447-0292  
 www.crockettengineering.com  
 Crockett Engineering Consultants, LLC  
 Missouri License Authority  
 2005001013

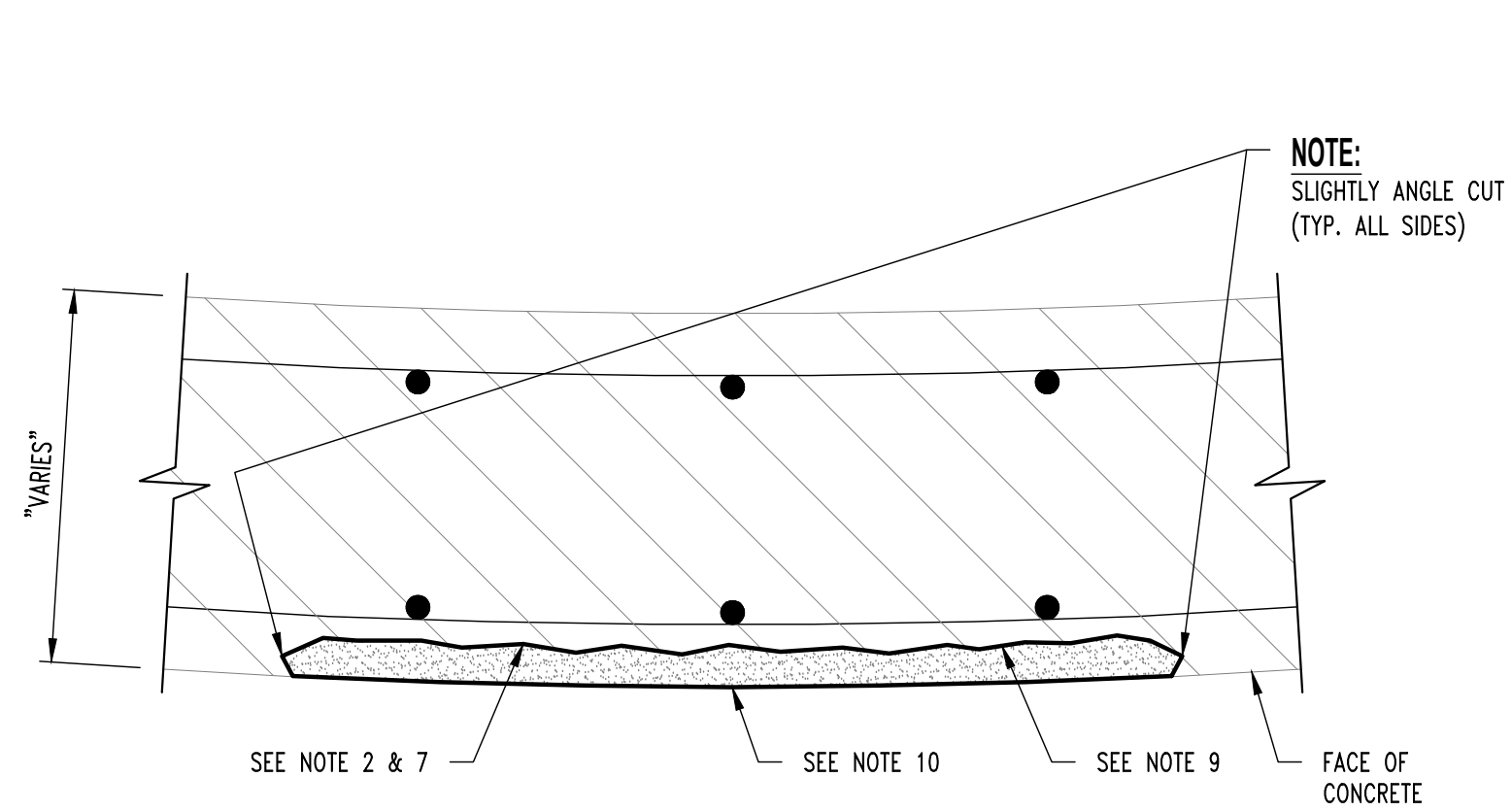
CLIENT:  
 UNIVERSITY OF MISSOURI  
 228 UNIVERSITY HALL  
 COLUMBIA, MISSOURI 65211

**CP220041 - VARIOUS LOCATIONS  
 REPAIR CONCRETE IN STEAM MANHOLES**  
 UNIVERSITY OF MISSOURI  
 COLUMBIA, BOONE COUNTY, MISSOURI

DRAWING INCLUDES:  
 SMH #634  
 (ALTERNATE #3)  
 PLAN & PHOTOS

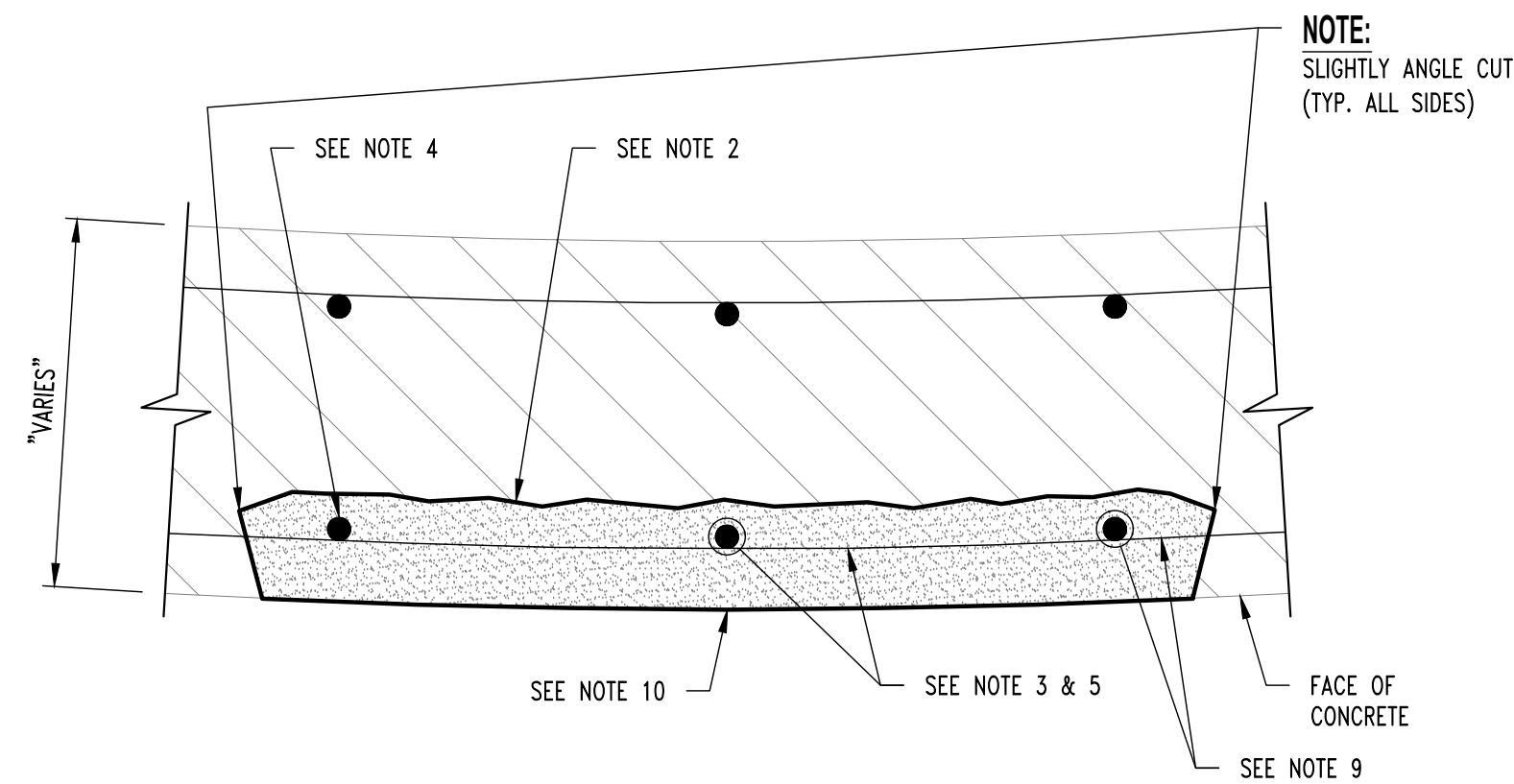
DESIGNED: GLL  
 DRAWN: RCA  
 PROJECT NO.: 180016  
 MU PROJECT NO.: CP220041  
 SHEET:  
 S207

- REPAIR NOTES**
- SMH #634 APPROXIMATE REPAIR AREAS
- NEAR THE LADDER THERE IS 48"x48" SPALLING X 1 INCH DEEP. (REPAIR #1 EXPECTED)
  - AROUND THE CHASE THERE IS REBAR EXPOSED AND 48"x4" SPALLING X 3 INCH DEEP. (REPAIR #3 EXPECTED)



**SURFACE SPALL REPAIR**  
REPAIR #1

NOTE:  
DETAIL APPLIES TO SURFACE  
SPALLS WITH NO REINFORCEMENT  
EXPOSED.

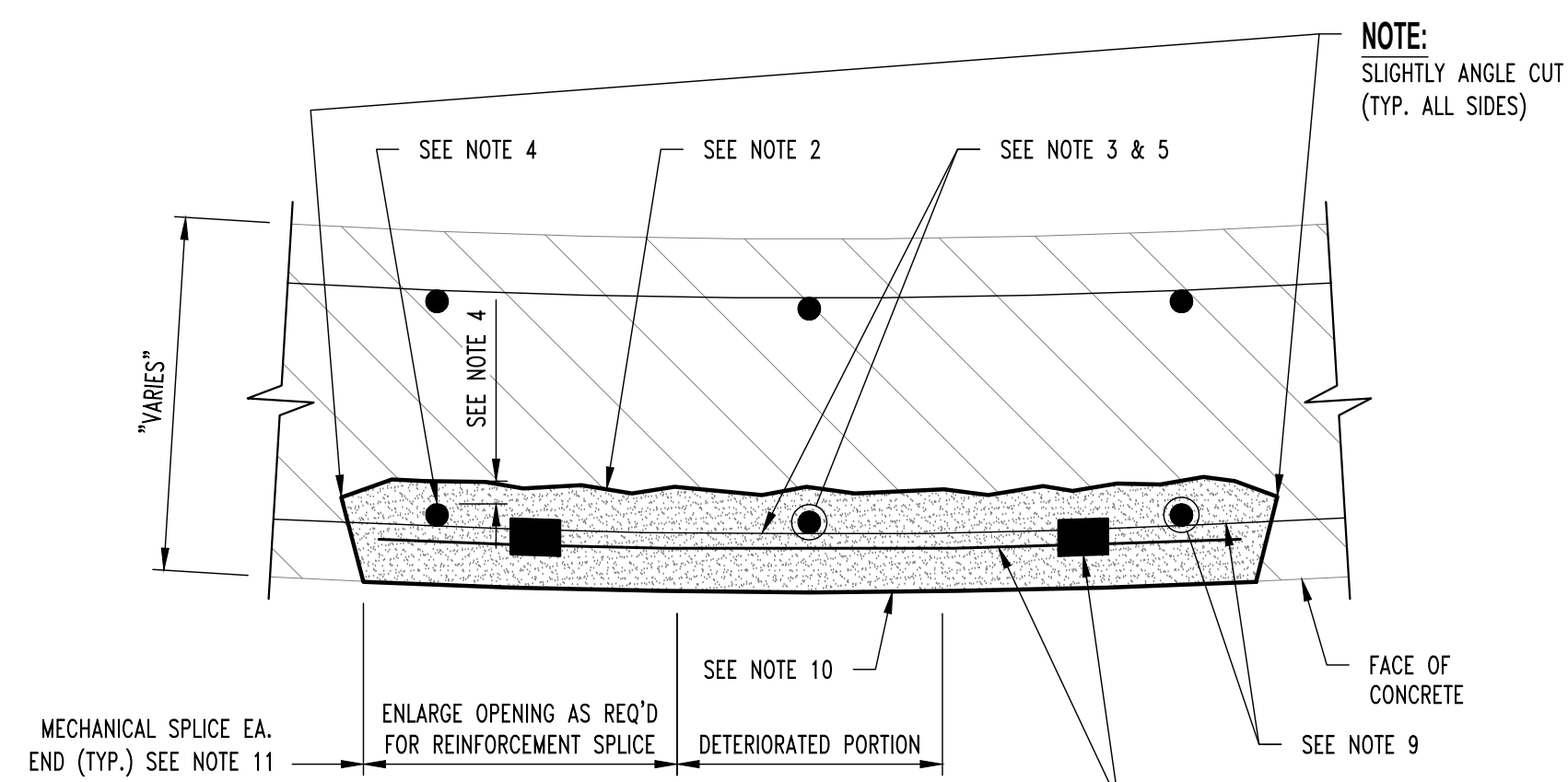


**DEEP SPALL w/ REINFORCEMENT  
SECTION LOSS LESS THAN OR EQUAL TO 25%**  
REPAIR #2

NOTE:  
DETAIL APPLIES TO SURFACE SPALLS  
WITH REINFORCEMENT EXPOSED.

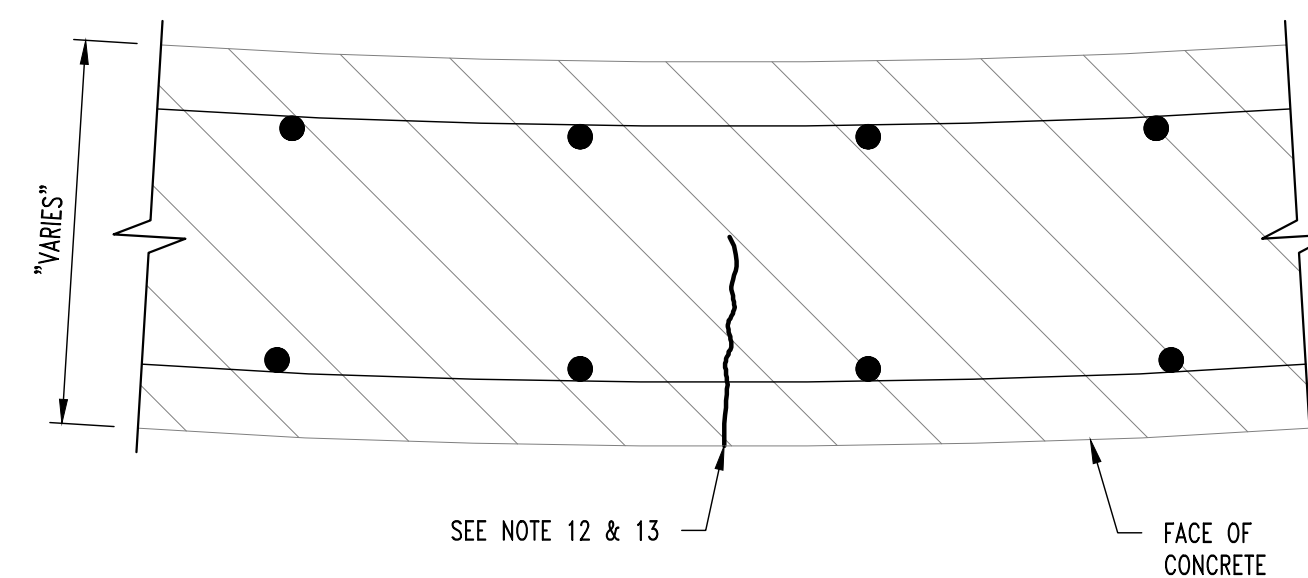
BAR SIZE	NOMINAL DIAMETER (IN.)	MINIMUM ALLOWABLE DIAMETER (IN.)
#3	0.375	0.325
#4	0.500	0.433
#5	0.625	0.541
#6	0.750	0.650
#7	0.875	0.758
#8	1.000	0.866
#9	1.128	0.977
#10	1.270	1.100

**REINFORCING BAR DIAMETER TABLE**



**DEEP SPALL w/ REINFORCEMENT  
SECTION LOSS GREATER THAN OR EQUAL TO 25%**  
REPAIR #3

NOTE:  
DETAIL APPLIES TO SURFACE SPALLS  
WITH REINFORCEMENT EXPOSED.

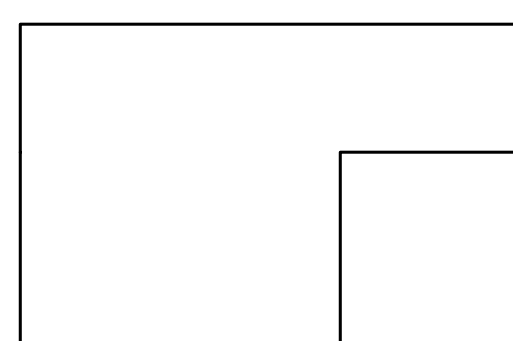


**CRACK REPAIR**  
REPAIR #4

NOTE:  
DETAIL APPLIES TO CRACKS  
LARGER THAN 0.03".



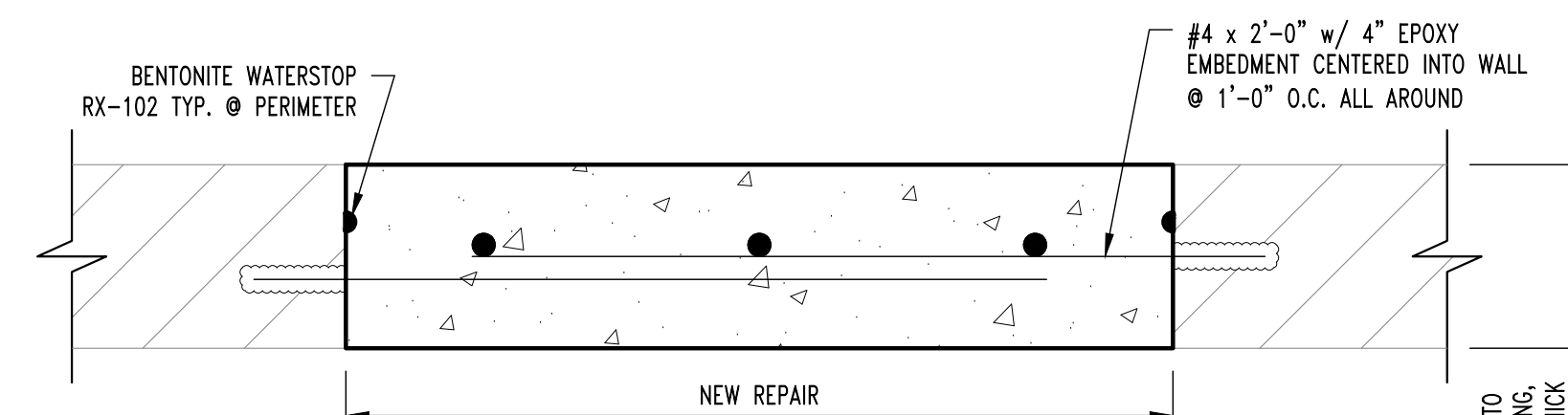
EXISTING BOUNDARY OF LOOSE,  
SPALLED, OR DELAMINATED CONCRETE



RECOMMENDED LAYOUT

**DETERIORATED CONCRETE SURFACE REPAIR**

NOTE:  
1. REPAIR CONFIGURATIONS TO BE  
KEPT AS SIMPLE AS POSSIBLE.  
2. CORNERS MUST BE SQUARED TO  
AVOID FEATHERED EDGES.



**FULL DEPTH REPAIR DETAIL**

**CONCRETE REPAIR NOTES**

- PRIOR TO PERFORMING ANY CONCRETE REPAIRS, CONTRACTOR SHALL EXAMINE THE ENTIRE CONCRETE SURFACE BY SOUNDING TO DETECT ANY DEFICIENCIES NOT SHOWN ON THE CONTRACT DOCUMENTS. IF DEFICIENCIES ARE DETECTED, MARK OUTLINE ON CONCRETE SURFACE AND NOTIFY OWNER'S REPRESENTATIVE. PROVIDE OWNER'S REPRESENTATIVE WITH APPROXIMATE SIZE AND LOCATION OF EACH DEFICIENCY NOTED.
- REMOVE ALL LOOSE AND DETERIORATED CONCRETE. CHIP OUT AND PATCH AREA 1/2" MIN. BEYOND SPALLED SURFACE. AT BOUNDARIES OF DETERIORATED CONCRETE, SAWCUT BOUNDARY TO A MINIMUM DEPTH OF 3/4". DO NOT FEATHER EDGES.
- CARE SHOULD BE EXERCISED NOT TO DAMAGE EXISTING REINFORCING STEEL DURING CONCRETE REMOVAL. CONCRETE REMOVAL SHALL EXTEND TO WHERE BAR IS WELL BONDED TO SURROUNDING SOUND CONCRETE. CARE SHALL BE EXERCISED NOT TO DAMAGE THE BAR'S BOND TO SURROUNDING CONCRETE. IF BOND BETWEEN BAR AND CONCRETE IS BROKEN, UNDERCUTTING OF THE BAR IS REQUIRED AS SPECIFIED IN ITEM 4 BELOW.
- IF HALF OF THE THICKNESS OF THE REINFORCEMENT BAR OR MORE IS EXPOSED PROVIDE A MINIMUM OF 1/2" CLEARANCE BETWEEN EXPOSED REINFORCEMENT AND SURROUNDING CONCRETE FOR HAND APPLIED REPAIR MATERIALS AND A MINIMUM OF 1" CLEARANCE FOR SPRAY APPLIED REPAIR MATERIALS.
- MECHANICALLY CLEAN STEEL BY SANDBLASTING OR WIRE BRUSH TO WHITE METAL CONDITION TO REMOVE CORROSION. AFTER CLEANING REINFORCING STEEL, MEASURE DIAMETER AT NARROWEST POINT. IF SECTION LOSS IS GREATER THAN 25% (SEE "REINFORCING BAR DIAMETER TABLE" ON THIS SHEET) ADD NEW REINFORCING BAR MATCHING SIZE OF EXISTING. MAINTAIN A MINIMUM OF 1/2" CONCRETE COVER AT ALL NEW AND EXISTING REINFORCEMENT, ANY REINFORCEMENT TO BE DRILLED AND GROUTED INTO EXISTING CONCRETE SHALL USE HILTI HIT HY 200 MAX EPOXY ADHESIVE (OR APPROVED EQUAL).
- SCARIFY CONCRETE SURFACE TO OBTAIN CONCRETE SURFACE PROFILE ROUGHENED.
- MINIMUM DEPTH OF PATCH TO BE 3/8".
- SUBSTRATE SHOULD BE SATURATED SURFACE DRY (SSD) WITH NO STANDING WATER DURING APPLICATION.
- APPLY CONCRETE PRIMER TO SUBSTRATE PER MANUFACTURERS SPECIFICATIONS. APPLY TWO COATS OF ANTI-CORROSION COATING PER MANUFACTURERS SPECIFICATIONS TO ALL EXPOSED REINFORCEMENT ALLOWING TO PROPERLY DRY BETWEEN COATS. SIKAFERROGARD 901 OR APPROVED EQUAL.
- WHILE CONCRETE PRIMER IS STILL WET, APPLY PATCH MATERIAL PER MANUFACTURERS SPECIFICATIONS. FOR APPLICATIONS GREATER THAN 1" IN DEPTH, APPLY PATCH MATERIAL IN LIFTS. SCORE THE TOP SURFACE OF EACH LIFT AND ALLOW EACH LIFT TO REACH FINAL SET THEN REPEAT FROM STEP 8.
- PROVIDE MECHANICAL SPLICE CAPABLE OF DEVELOPING 125% F<sub>y</sub>. MAINTAIN A MINIMUM OF 1/2" CONCRETE COVER AT ALL NEW AND EXISTING REINFORCEMENT.
- CLEAN CRACK SURFACES AND REMOVE ANY FOREIGN MATTER AND DEPOSITS.
- INSTALL POLYMER MODIFIED CEMENTITIOUS PATCHING MATERIAL PER MANUFACTURERS SPECIFICATION AND TOOL SURFACE TO MATCH SURROUNDING SURFACE. SIKATOP-123 OR APPROVED EQUAL.
- LID REPAIRS REQUIRE SHORING TO BE INSTALLED PRIOR TO DAMAGED CONCRETE BEING REMOVED. SHORING SHALL PROVIDE ADEQUATE SUPPORT TO STRUCTURE UNTIL PATCH IS INSTALLED AND CURED.
- ALL UTILITIES IN AREA OF MANHOLE WILL REMAIN ACTIVE DURING THE DURATION OF THE PROJECT INCLUDING THE STEAMLINES INSIDE THE MANHOLE. ALL INSULATION, PIPING EQUIPMENT, STEAM CONDENSATE, ETC. NEEDS TO BE PROTECTED AS TO NOT DAMAGE DURING CONSTRUCTION. ANY DAMAGED MATERIALS WILL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

**REVISIONS:**

No.	Date
BID SET	01/12/2022



CLIENT:  
**UNIVERSITY OF MISSOURI**  
225 UNIVERSITY HALL  
COLUMBIA, MISSOURI 65211

**CP220041 - VARIOUS LOCATIONS  
REPAIR CONCRETE IN STEAM MANHOLES**  
**UNIVERSITY OF MISSOURI  
COLUMBIA, BOONE COUNTY, MISSOURI**

**DRAWING INCLUDES:**

REPAIR DETAILS  
& NOTES

DESIGNED: GLL

DRAWN: RCA

PROJECT NO.: 180016

MU PROJECT NO.: CP220041

SHEET:

S300