

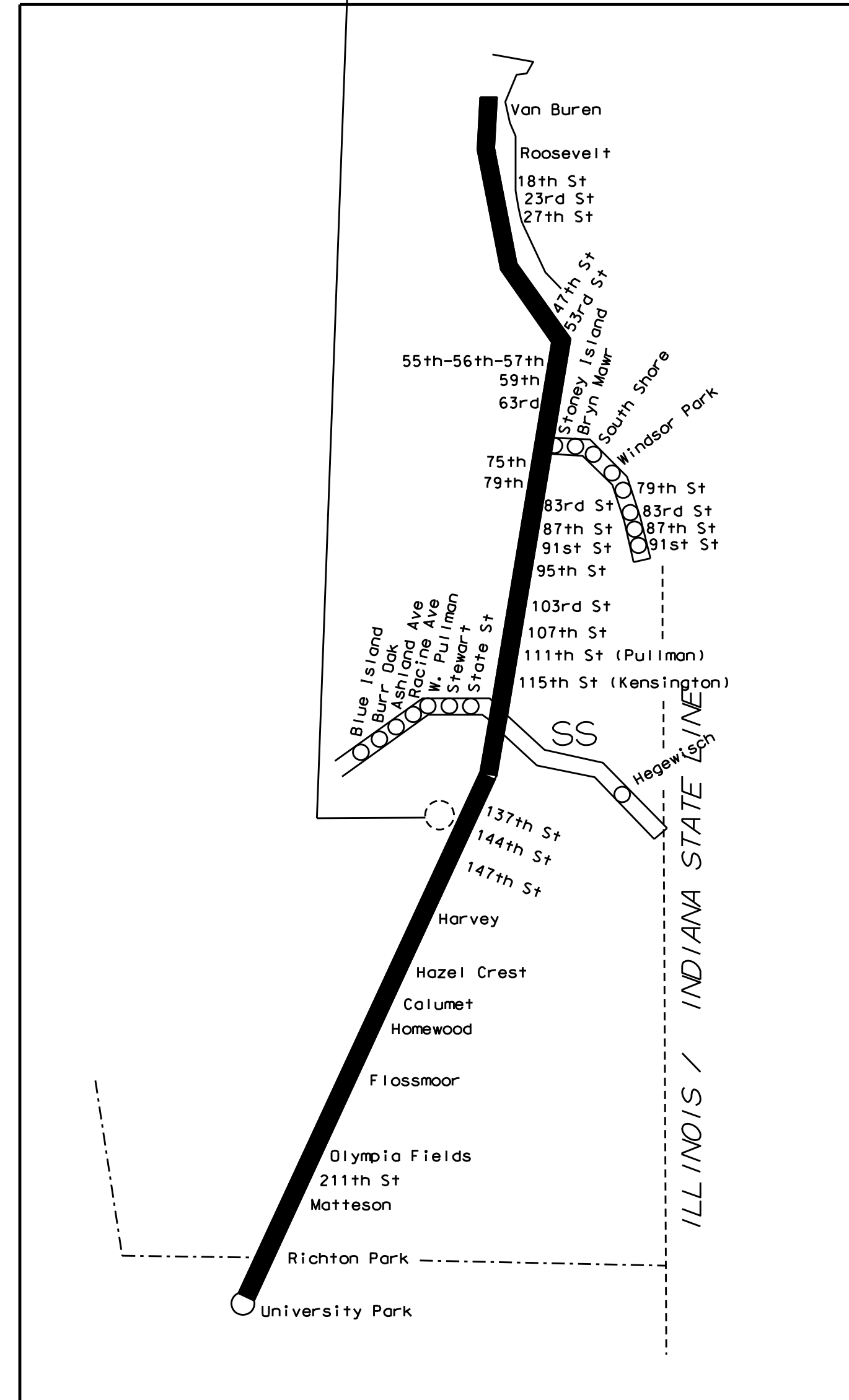
SUBSTATION

Metra

RIVERDALE SUBSTATION

DRAWING LIST

- CS-17.5-1000 COVER SHEET
- SS-17.5-1001 TOPOGRAPHICAL SURVEY
- SS-17.5-1001G GENERAL NOTES
- SS-17.5-1017 SITE PLAN, SECTION AND NOTES
- SS-17.5-1017A LANDSCAPING PLAN, DETAILS, SCHEDULES AND NOTES
- SS-17.5-1018 FRAMING PLAN
- SS-17.5-1019 FOUNDATION AND FRAMING DETAILS
- SS-17.5-1020A STAIR, RAILING AND GATE DETAILS
- SS-17.5-1020B CHAIN LINK FENCE DETAILS
- SS-17.5-1020C CHAIN LINK SWING GATE DETAILS
- SS-17.5-1050 SUBSTATION EQUIPMENT LAYOUT PLAN
- SS-17.5-1070 ELECTRICAL SITE PLAN
- SS-17.5-1071 UNDERGROUND CONDUIT AND DUCTBANK LAYOUT
- SS-17.5-1072 DUCTBANK PROFILES
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- SS-17.5-1085 ENLARGED PLANS, ELEVATIONS AND DETAILS
- SS-17.5-4001 12.5KV AC SINGLE LINE DIAGRAM
- SS-17.5-4002 NOT USED
- SS-17.5-4003 TRACTION POWER ONE LINE DIAGRAM
- SS-17.5-4004 NOT USED
- SS-17.5-4005 NOT USED
- SS-17.5-4006 TRANSF.'S, RECTIFIERS & DC SWGR SINGLE LINE DIAGRAM
- SS-17.5-4101 12.5KV AC THREE LINE DIAGRAM, SHEET 1 OF 3
- SS-17.5-4102 12.5KV AC THREE LINE DIAGRAM, SHEET 2 OF 3
- SS-17.5-4103 12.5KV AC THREE LINE DIAGRAM, SHEET 3 OF 3
- SS-17.5-4104 NOT USED
- SS-17.5-4105 12.5KV AC SCHEMATIC DIAGRAM INC. LINE BKRS. 152-1 & 152-2
- SS-17.5-4106 12.5KV AC SCHEMATIC DIAGRAM BUS TIE BKR. 52BT
- SS-17.5-4107 12.5KV AC SCHEMATIC DIAGRAM RECT. TRANSF. BKR. 52-T1 & 52-T2
- SS-17.5-4108 NOT USED
- SS-17.5-4109 NOT USED
- SS-17.5-4110 12.5KV AC SCHEMATIC DIAGRAM BUS-1 DIFFERENTIAL LOCKOUT
- SS-17.5-4111 12.5KV AC SCHEMATIC DIAGRAM BUS-2 DIFFERENTIAL LOCKOUT
- SS-17.5-4201 1500V DC SCHEMATIC DIAGRAM RECTIFIER-1 POWER & AUXILIARIES
- SS-17.5-4202 1500V DC SCHEMATIC DIAGRAM RECTIFIER-1 CONTROLS & ANNUNCIATOR
- SS-17.5-4203 NOT USED
- SS-17.5-4204 1500V DC SCHEMATIC DIAGRAM RECTIFIER-2 POWER & AUXILIARIES
- SS-17.5-4205 1500V DC SCHEMATIC DIAGRAM RECTIFIER-2 CONTROLS & ANNUNCIATOR
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- SS-17.5-4209 RECTIFIER PLC LOGIC DIAGRAM SHEET 4
- SS-17.5-4210 1500V DC SCHEMATIC DIAGRAM RECTIFIER-1 BREAKER 72-1
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- SS-17.5-4226 1500V DC SCHEMATIC DIAGRAM DC SWITCHGEAR GROUND RELAY
- SS-17.5-4304A DC FEEDER BREAKER SECTION NO. 174 SCHEMATIC DIAGRAM
- SS-17.5-4305A DC FEEDER BREAKER SECTION NO. 175 SCHEMATIC DIAGRAM
- SS-17.5-4306A DC FEEDER BREAKER SECTION NO. 176 SCHEMATIC DIAGRAM
- SS-17.5-4307A DC FEEDER BREAKER SECTION NO. 177 SCHEMATIC DIAGRAM
- SS-17.5-4308A DC FEEDER BREAKER SECTION NO. T-BKR SCHEMATIC DIAGRAM
- SS-17.5-5000 STATION CONTROL ARCHITECTURE NEW BUILDING INTERFACES
- SS-17.5-5001 STATION CONTROL ARCHITECTURE EXISTING BUILDING INTERFACES



SYSTEM MAP
ELECTRIC DISTRICT



PRINTED ON: SDATES

REV	DATE	BY	APP	DESCRIPTION	REV	DATE	BY	APP	DESCRIPTION
2	06-08-2018	JMC	HS	ISSUED FOR BID					
1	03-30-2018	HS	HS	ISSUED FOR ADDENDUM 1					
0	07-28-2017	HS	HS	ISSUED FOR BID					

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Metra
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547 W. JACKSON BOULEVARD
CHICAGO, ILLINOIS 60661

LOCATION NAME:
RIVERDALE SUBSTATION

TITLE:
COVER SHEET

CAD FILE NUMBER: CS-17.5-1000.DGN

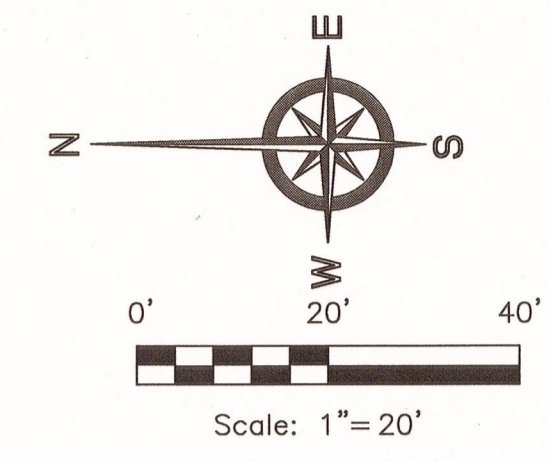
SCALE:
NTS

DISTRICT:
MED

PROJECT NO.
GW4254-57102002

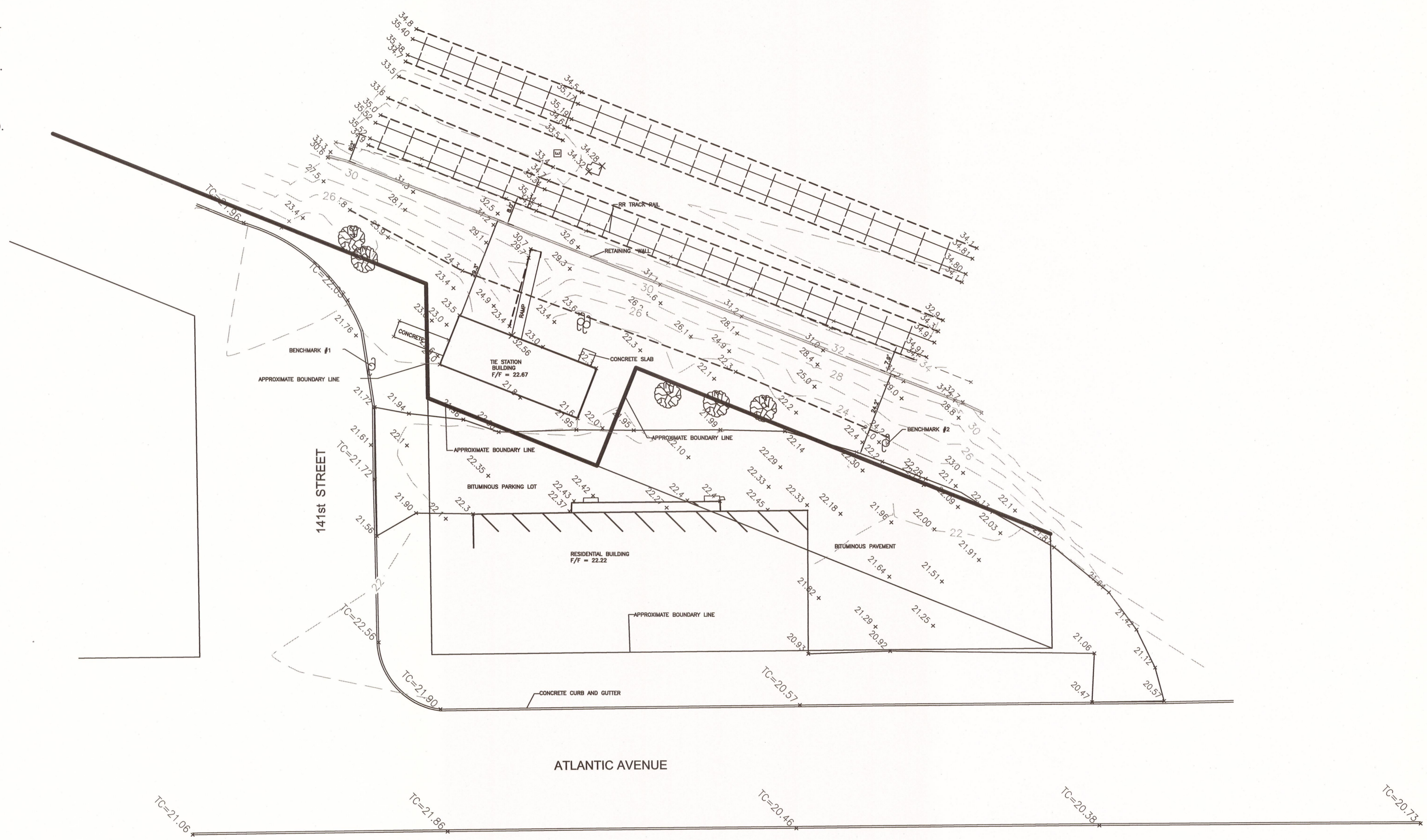
SHEET NO.
CS-17.5-1000

MILE POST NO.
17.5



SURVEYOR'S NOTES:

1. ALL DIMENSIONS ARE GIVEN IN FEET AND DECIMAL PARTS THEREOF.
2. BEARINGS BASED ON ILLINOIS STATE PLANE COORDINATES, EAST ZONE, NAD83(2011), GPS DERIVED.
3. VERTICAL DATUM IS ASSUMED.
4. ONLY THOSE BUILDING LINE SETBACKS AND EASEMENTS WHICH ARE SHOWN ON THE RECORDED PLAT OF SUBDIVISION ARE SHOWN HEREON, UNLESS OTHERWISE INDICATED. REFER TO THE DEED, TITLE INSURANCE POLICY AND LOCAL ORDINANCES FOR OTHER RESTRICTIONS WHICH MAY OR MAY NOT EXIST.
5. COMPARE DEED DESCRIPTION AND SITE CONDITIONS WITH THE DATA GIVEN ON THIS PLAT AND REPORT ANY DISCREPANCIES TO THE SURVEYOR AT ONCE.
6. NO DIMENSIONS SHALL BE DERIVED FROM SCALE MEASUREMENT.
7. DISTANCES ALONG CURVES ARE ARC DISTANCES UNLESS OTHERWISE NOTED.
8. THIS SURVEY WAS PERFORMED ON THE GROUND AND COMPLETED 05/04/2017.
9. ONLY THE IMPROVEMENTS THAT WERE VISIBLE FROM ABOVE GROUND AT TIME OF SURVEY AND THROUGH A NORMAL SEARCH AND WALK THROUGH OF THE SITE ARE SHOWN ON THE FACE OF THIS PLAT. LAWN SPRINKLER SYSTEMS, IF ANY, ARE NOT SHOWN ON THIS SURVEY.
10. SURFACE INDICATIONS OF UTILITIES ON THE SURVEYED PARCEL HAVE BEEN SHOWN. UNDERGROUND AND OFFSITE OBSERVATIONS HAVE NOT BEEN MADE TO DETERMINE THE EXTENT OF UTILITIES SERVING OR EXISTING ON THE PROPERTY. PUBLIC AND/OR PRIVATE RECORDS HAVE NOT BEEN SEARCHED TO PROVIDE ADDITIONAL INFORMATION. OVERHEAD WIRES, IF ANY, ARE EXISTING AND THEIR POLES HAVE BEEN SHOWN, HOWEVER THEIR FUNCTION AND DIMENSIONS HAVE NOT BEEN NOTED.
11. OTHER THAN VISIBLE OBSERVATIONS NOTED HEREON, THIS SURVEY MAKES NO STATEMENT REGARDING THE ACTUAL PRESENCE OR ABSENCE OF ANY SERVICE OR UTILITY LINE. CONTROLLED UNDERGROUND EXPLORATORY EFFORT TOGETHER WITH J.U.L.I.E. LOCATIONS IS RECOMMENDED TO DETERMINE THE FULL EXTENT OF UNDERGROUND SERVICE AND UTILITY LINES. CONTACT J.U.L.I.E. AT: 1-800-892-0123.



BENCHMARK #1
BENCH TIE NAIL
IN UTILITY POLE
ELEV.=23.94

BENCHMARK #2
BENCH TIE NAIL
IN UTILITY POLE
ELEV.=24.97

LEGEND	
SYMBOL	DESCRIPTION
	BENCHMARK LOCATION
	WATER VALVE
	ELECTRIC MANHOLE
	GUY WIRE ANCHOR
	POWER POLE
	GAS VALVE
	GAS METER
	CATCH BASIN ROUND
	DRAIN
	BOLLARD
	STREET LIGHT STANDARD
	STREET LIGHT W/MAST ARM
	SIGN
	STEEL POST
	SHRUB
	DECIDUOUS TREE W/SIZE
	SPOT GRADE
	RECORD BEARING OR DISTANCE
	MEASURED BEARING OR DISTANCE
	TOP OF CURB
	FLOWLINE
	TOP OF WALL
	FINISHED FLOOR
	BUILDING FOOT PRINT
	COMBINATION SEWER LINE
	OVERHEAD WIRES
	CHAINLINK FENCE LINE
	WOOD/IRON FENCE LINE
	STEEL GUARDRAIL

STATE OF ILLINOIS
)SS
COUNTY OF COOK)

THIS IS TO CERTIFY THAT THE TOPOGRAPHIC IMPROVEMENTS DEPICTED HEREON WERE SURVEYED UNDER THE DIRECT SUPERVISION OF AN ILLINOIS PROFESSIONAL LAND SURVEYOR, AND THAT THIS PLAT REPRESENTS THE CONDITIONS FOUND AT THE TIME OF SAID SURVEY.

GIVEN UNDER MY HAND AND SEAL THIS 17TH OF JANUARY, 2018 IN CHICAGO, ILLINOIS.

ENVIRONMENTAL DESIGN INTERNATIONAL, INC.
PROFESSIONAL DESIGN FIRM NO. 184-001224

William J. Fleming

WILLIAM FLEMING, IPLS NO. 035.003226
LICENSE EXPIRES: 11/30/2018

THIS PROFESSIONAL SERVICE CONFORMS TO THE CURRENT ILLINOIS MINIMUM STANDARDS FOR TOPOGRAPHIC SURVEYS.

THIS PLAT IS VALID ONLY WITH AN ORIGINAL SIGNATURE AND EMBOSSED SEAL.

PRINTED ON: 01/17/2018

REV	DATE	BY	APP	DESCRIPTION
0	01-17-2018	MW	WF	ISSUED FOR BID



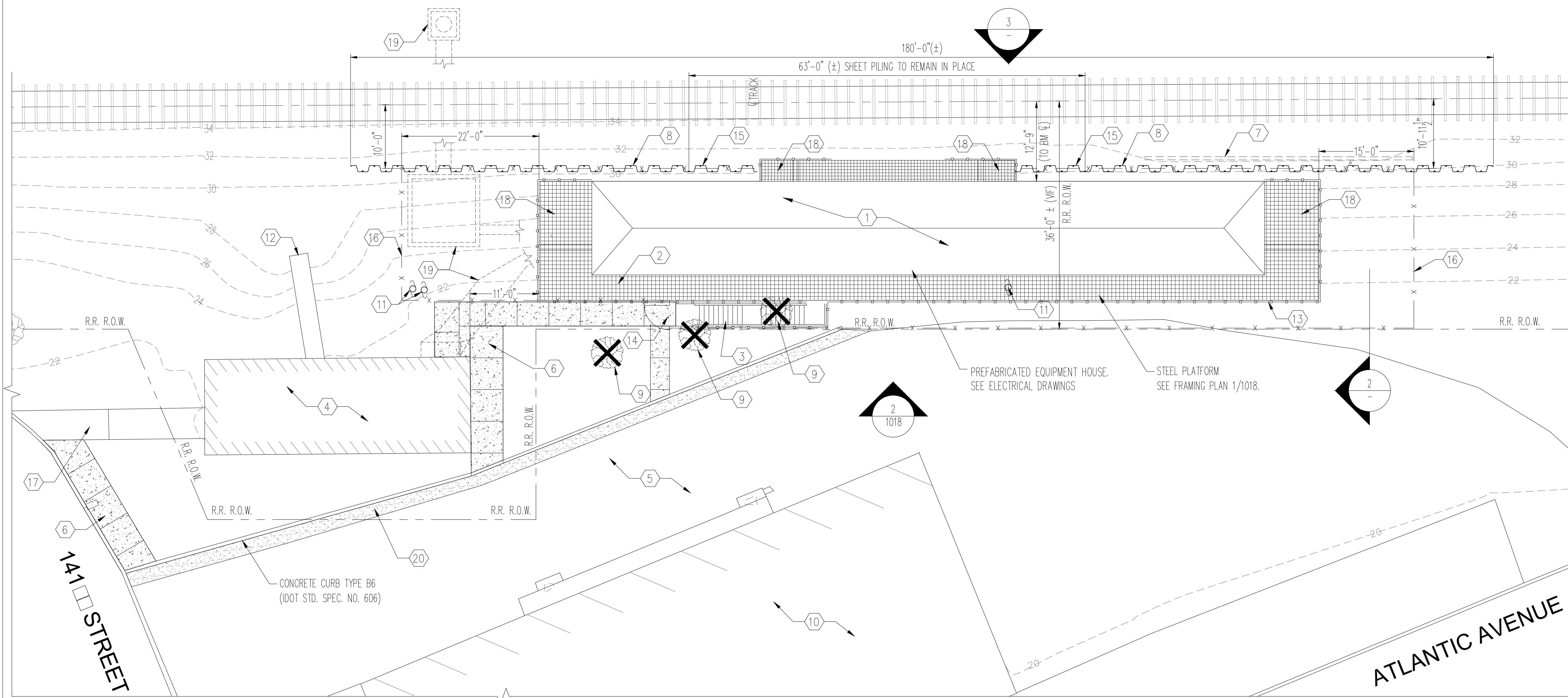
EDI
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Construction Inspection Services
33 W. Monroe St., Suite 1825
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www.envdesigni.com MBE/WBE/DBE

DESIGNED: WF
DRAWN: MW
CHECKED: WF
METRA P.M.: R. CERANT
DATE: JANUARY 17, 2018

Metra
ENGINEERING DEPARTMENT
547 W. JACKSON BOULEVARD
CHICAGO, ILLINOIS 60661

LOCATION NAME: **RIVERDALE SUBSTATION**
TITLE: **TOPOGRAPHIC SURVEY**

CAD FILE NUMBER: SS-17.5-1001.DGN
SCALE: AS SHOWN
PROJECT NO. GW4254-57102002
MILE POST NO. 17.5
DISTRICT: MED
SHEET NO. **SS-17.5-1001**

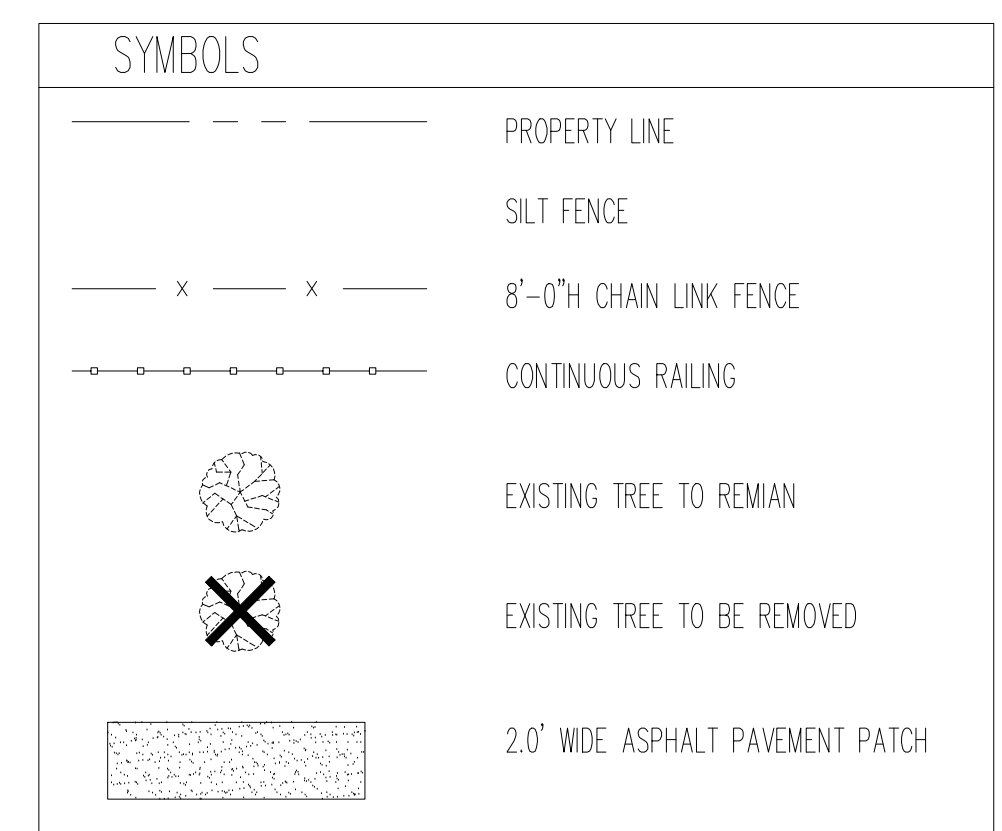


- KEY NOTES**
- ① REMOVE TREES, SHRUBS AND TOPSOIL WITHIN THE REMOVAL AREA.
 - ② PLATFORM GRATING
 - ③ STAIR AND LANDING
 - ④ EXISTING TIE-STATION BUILDING TO REMAIN
 - ⑤ EXISTING ACCESS DRIVE TO REMAIN
 - ⑥ 5" TH. PCC SIDEWALK
 - ⑦ EXISTING RAILROAD TIE RETAINING WALL TO BE REMOVED
 - ⑧ TEMPORARY SHEET PILING TO BE REMOVED AFTER CONSTRUCTION
 - ⑨ REMOVE EXISTING TREE AND STUMP
 - ⑩ EXISTING APARTMENT BUILDING N.I.C.
 - ⑪ REMOVE EXISTING UTILITY POLES AND OVERHEAD WIRES
 - ⑫ EXISTING CONCRETE ENCASED CONDUIT TO REMAIN
 - ⑬ GUARD RAILING-3 SIDES
 - ⑭ 4'-0" Wx8'-0" H CHAIN LINK GATE W/ PADLOCK
 - ⑮ SHEET PILING TO REMAIN AFTER CONSTRUCTION
 - ⑯ 8'-0" H CHAIN LINK FENCE
 - ⑰ EXISTING CONCRETE WALKWAY TO REMAIN
 - ⑱ DOOR LANDING
 - ⑲ ELECTRICAL MANHOLE AND DUCTBANK. SEE SHEETS 1070, 1071.
 - ⑳ SAW CUT, REMOVE PORTION OF EXISTING PAVEMENT. INSTALL PAVEMENT PATCH PER IDOT STD. SPEC. SECT. 440 AND 442.

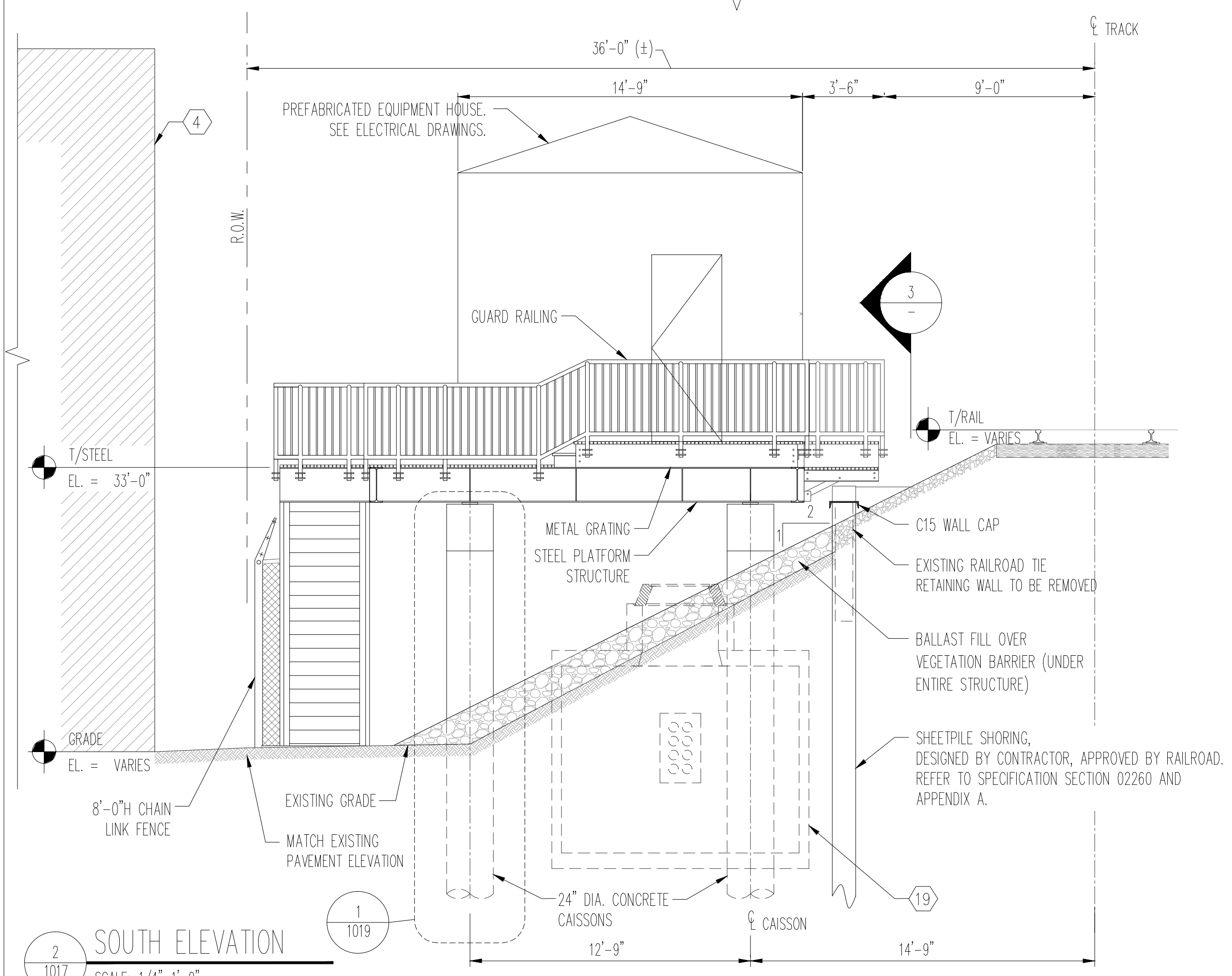
- DEMOLITION/REMOVAL NOTES:**
1. REMOVE EXISTING VEGETATION, TREES, STUMPS AND TOPSOIL WITHIN THE AREA SHOWN ON PLAN. REGRADE AFTER CAISSON INSTALLATION, INSTALL VEGETATION BARRIER FABRIC AND 6" TH. CA-7 ON TOP OF FABRIC.
 2. EXACT EXTENT OF REMOVAL MAY NOT BE FULLY INDICATED BY THE DRAWINGS. THE CONTRACTOR SHALL CONFIRM WITH METRA AND DETERMINE THE NATURE AND EXTENT OF REMOVAL THAT WILL BE REQUIRED BY COMPARING THE DRAWINGS WITH THE EXISTING FIELD CONDITIONS. IT IS EXPRESSLY UNDERSTOOD THAT THIS CONTRACT INCLUDES ALL WORK OF A REMOVAL NATURE THAT MAY BE REQUIRED OR NECESSARY FOR A FULL AND COMPLETE EXECUTION OF THE WORK, WHETHER PARTICULARLY REFERRED TO HEREIN OR NOT.

CHAIN LINK FENCE:

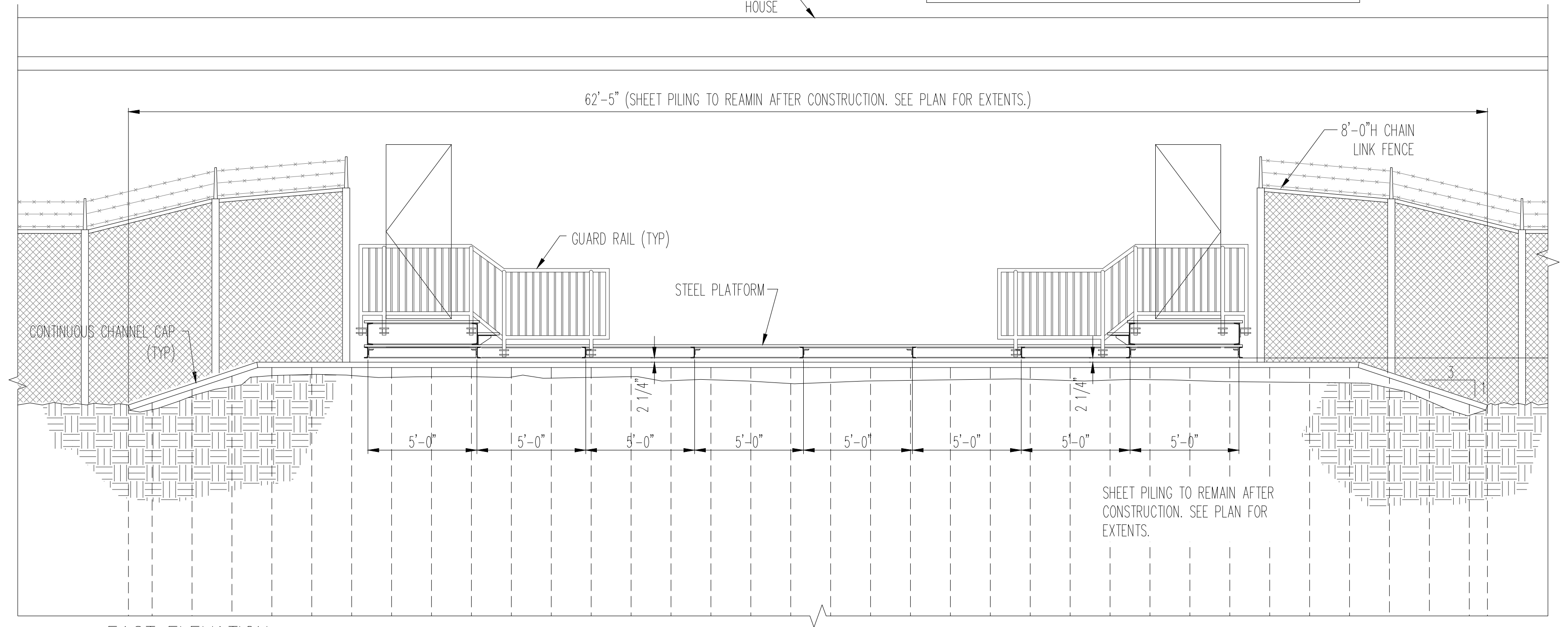
CHAIN LINK FENCE AND GATES SHALL BE DESIGNED AND INSTALLED AS SPECIFIED IN SPECIFICATION SECTION 02443. REFER TO SHEET SS-17.5-1020B AND SS-17.5-1020C FOR TYPICAL FENCE AND SWING GATE DETAILS.



1 SITE PLAN
SCALE: 1"=10'-0"



2 SOUTH ELEVATION
SCALE: 1/4"=1'-0"



3 EAST ELEVATION
SCALE: 1/4"=1'-0"

PRINTED ON: 07/28/2017

REV	DATE	BY	APP	DESCRIPTION
0	07-28-2017	OT	EG	ISSUED FOR BID

CONSULTANT SEAL & SIGNATURE

CONSULTANT

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DESIGNED: EG
DRAWN: DC
CHECKED: MK
METRA P.M.: R. CERANT
DATE: JUNE 12, 2017

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CHICAGO, ILLINOIS 60661

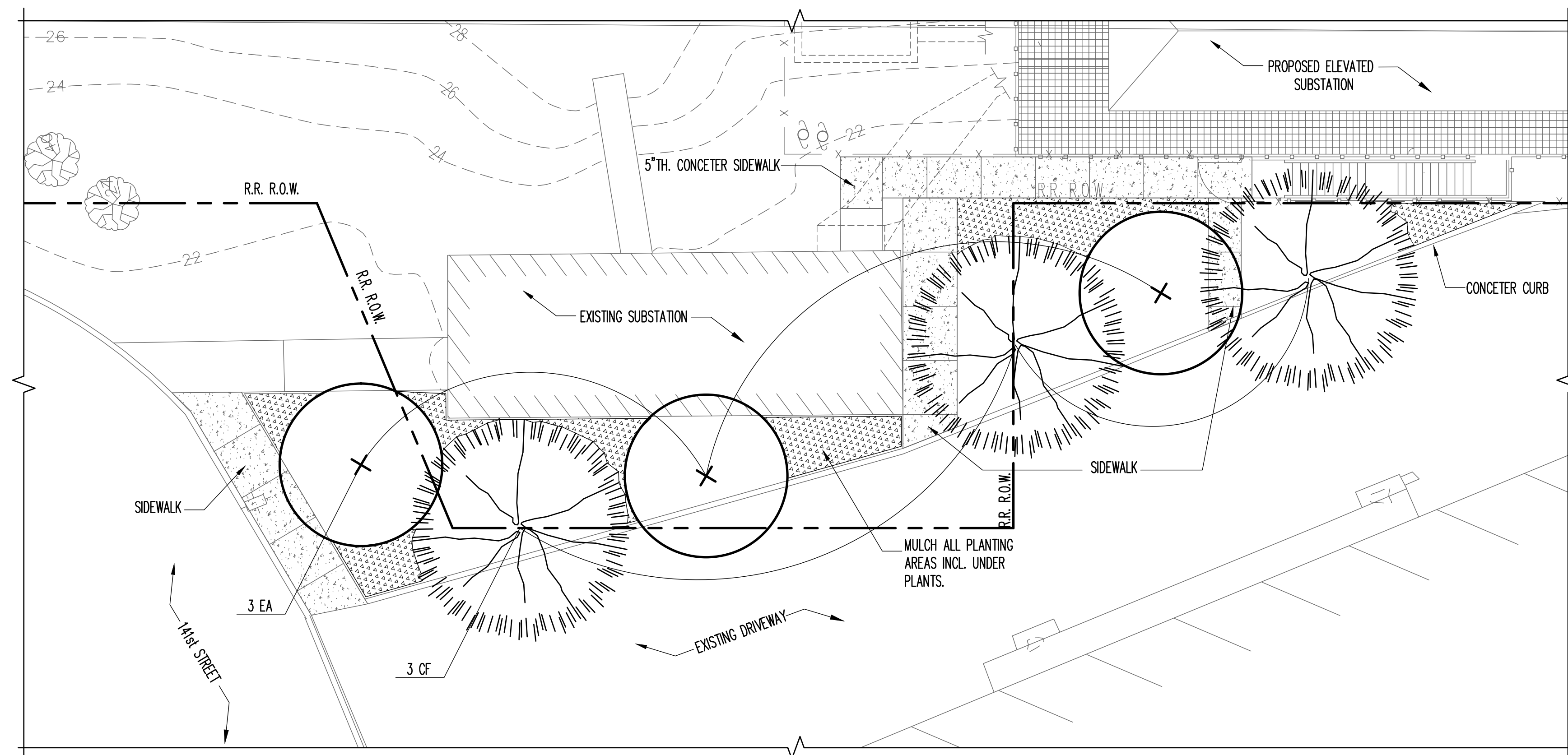
LOCATION NAME: **RIVERDALE SUBSTATION**

TITLE: **SITE PLAN, SECTION AND NOTES**

CAD FILE NUMBER: SS-17.5-1017.DGN

SCALE: AS SHOWN
PROJECT NO. GW4254-57102002
MILE POST NO. 17.5

DISTRICT: MED
SHEET NO. **SS-17.5-1017**

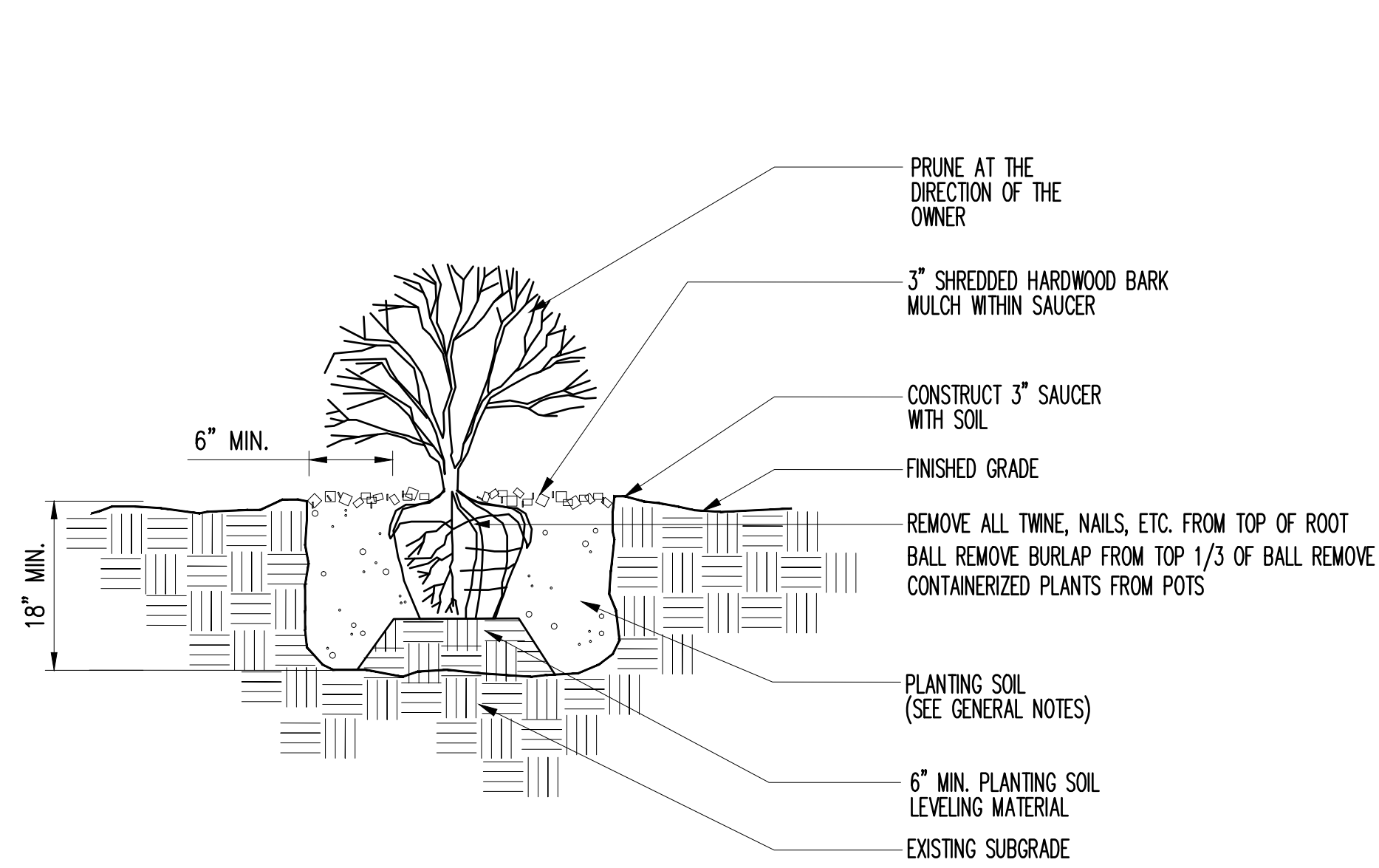


1
1017A
PARTIAL LANDSCAPING PLAN
SCALE: 1/8"=1'-0"
N

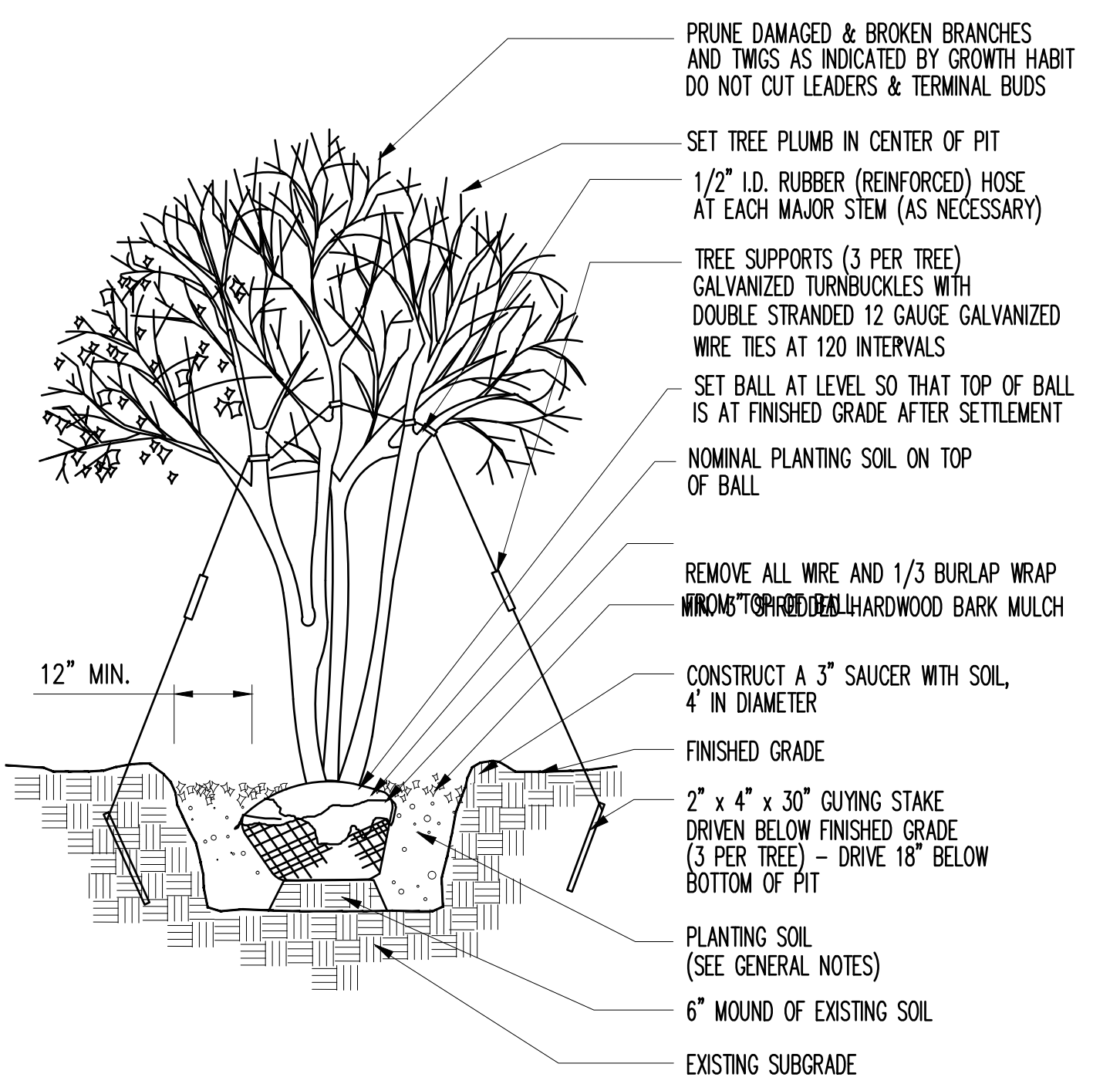
LANDSCAPING SCHEDULE						
SYMBOL	QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	NOTES/SPECIAL CONDITIONS
UNDERSTORY TREES CF	3	CORNUS FLORIDA	FLOWERING DOGWOOD	6'-9" HT.	SEE PLAN	B&B/MULTI-STEM
DECIDUOUS SHRUBS EA	3	EVONYMUS ALATUS	WINGED EVONYMUS	4'-8" HT.	SEE PLAN	B&B OR C.G.

GENERAL NOTES

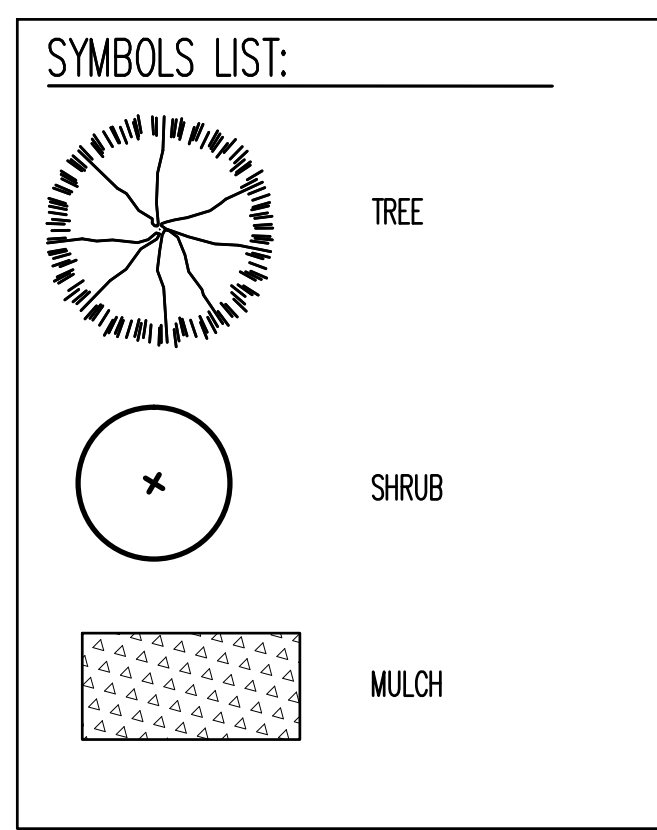
- GENERAL NOTES SHALL APPLY TO ALL NEW LANDSCAPE WORK IN THIS CONTRACT.
- PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES, CONTRACTOR SHALL NOTIFY THE LOCAL UTILITY ALERT NETWORK FOR EACH MUNICIPALITY IN WHICH SITE WORK OCCURS, TO DETERMINE THE LOCATION OF ANY UNDERGROUND UTILITIES, WHICH MAY AFFECT PROPOSED SITE WORK. CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY OF ANY DISCREPANCIES, OBSTACLES AND/OR PROBLEMS.
- VERIFICATION OF DIMENSIONS AND GRADES, BOTH EXISTING AND PROPOSED, SHALL BE THE CONTRACTOR'S RESPONSIBILITY PRIOR TO COMMENCEMENT OF WORK. THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY DISCREPANCIES.
- ALL SURFACE DRAINAGE SHALL BE DIRECTED AWAY FROM STRUCTURES. SURFACE DRAINAGE SHALL BE DIRECTED TO EXISTING CATCH BASINS DESIGNATED FOR THE COLLECTION OF SURFACE RUN-OFF.
- CONTRACTOR SHALL REPAIR IN KIND ANY AREAS DAMAGED AS A RESULT OF LANDSCAPE OPERATIONS.
- ALL TREE, SHRUB PERENNIAL AND ORNAMENTAL GRASS BEDS TO RECEIVE A MINIMUM 2" OF SHREDDED HARDWOOD MULCH.
- ALL PERENNIAL, ORNAMENTAL GRASSES AND GROUND COVER BEDS TO RECEIVE A MINIMUM 2" MUSHROOM COMPOST.
- PLANT MATERIAL SIZES SHOWN ON PLANT SCHEDULE ARE MINIMUM ACCEPTABLE SIZES.
- PLANTING SOIL SHALL BE USED FOR THE PLANTING MEDIUM FOR THE PROJECT AND SHALL COMPLY WITH SPECIFICATIONS.
- THE CONTRACTOR SHALL PREPARE PLANTING BEDS BY ADDING SOIL AMENDMENTS UNLESS NOTED OTHERWISE PER PLANTING DETAILS ON SHT. L4. PLANTING SOIL SHALL BE 12" MIN. THICK IN ALL LANDSCAPING AREAS EXCEPT SEED AND SOD AREAS WHICH SHALL RECEIVE 6" THICK PLANTING SOIL. TREES AND SHRUBS SHALL RECEIVE 18" MIN. THICK PLANTING SOIL.
- ALL PLANTS TO BE BALLED AND BURLAPPED OR CONTAINER GROWN AS SPECIFIED IN PLANT SCHEDULE. ALL PLASTIC ROOT WRAPPING MATERIAL AND METAL WIRE BASKETS SHALL BE REMOVED.
- CONTRACTOR SHALL WATER ALL PLANTS IMMEDIATELY AFTER PLANTING. FLOOD PLANTS TWICE DURING FIRST TWENTY-FOUR HOURS AFTER PLANTING.
- ALL NEW TRANSPLANTED SHRUBS TO BE SPRAYED WITH AN ANTIDESSICANT WITHIN TWENTY-FOUR HOURS AFTER PLANTING. ANTI-TRANSPIRANT SHALL BE EQUAL TO "WILTRUF".
- ALL ROAD AND WALK SURFACES SHALL BE KEPT CLEAR OF MUD AND DEBRIS AT ALL TIMES.
- ALL AREAS THAT HAVE BEEN DISRUPTED DURING THE CONSTRUCTION PROCESS, AND HAVE NOT BEEN DESIGNATED WITH NEW LANDSCAPE PLANTINGS, SHALL BE RESTORED WITH IDOT CLASS 2 SEEDING AND EROSION CONTROL BLANKET.
- THE FOLLOWING GUIDELINES SHALL BE FOLLOWED WHEN PLACING TREES. NO TREE SHALL BE PLANTED CLOSER THAN:
 - 5 FEET FROM DRIVEWAYS, HYDRANTS, B-BOXES & UNDERGROUND UTILITY SERVICES
 - 15 FEET FROM STREET LIGHTS
 - 100 FEET FROM ANY TRAFFIC CONTROL DEVICE (TRAFFIC LIGHT)
 ADJUST TREE LOCATIONS AS REQUIRED.
- TREES SELECTED FOR PLANTING SHALL BE LOCALLY GROWN WITHIN A 100 MILE RADIUS OF THE PROJECT LOCATION. SPECIES AND VARIETY SHALL BE VERIFIED AGAINST THE CITY PLANTING LIST AND SHALL BE TAGGED WITH THE SCIENTIFIC AND COMMON NAMES. THE CONTRACTOR INSTALLING THE TREES SHALL SUPPLY THE CITY WITH A LETTER STATING WHERE THE TREES WERE GROWN. THEY SHALL BE HEALTHY, FREE OF INSECTS AND DISEASE AND SHALL BE CONFORM TO THE AMERICAN ASSOCIATION OF NURSERYMAN'S STANDARD FOR NURSERY STOCK ANSI Z 60.1 - 2004 STANDARD.



2
1017A
SHRUB PLANTING DETAIL
SCALE: N.T.S.



3
1017A
TREE PLANTING DETAIL
SCALE: N.T.S.



PRINTED ON: 01/17/2018

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CONSULTANT SEAL & SIGNATURE

CONSULTANT

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ARCHITECTS ■ ENGINEERS

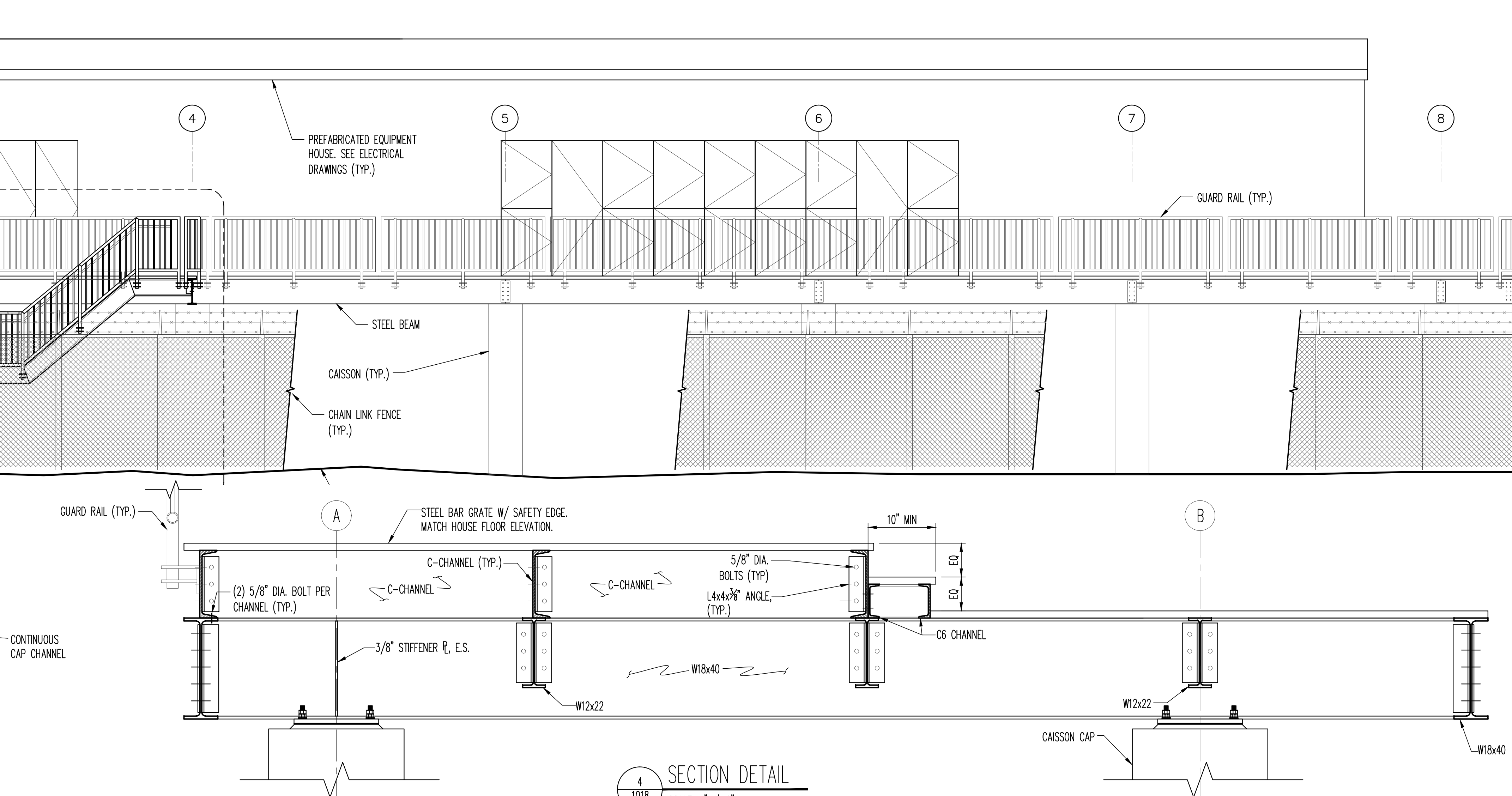
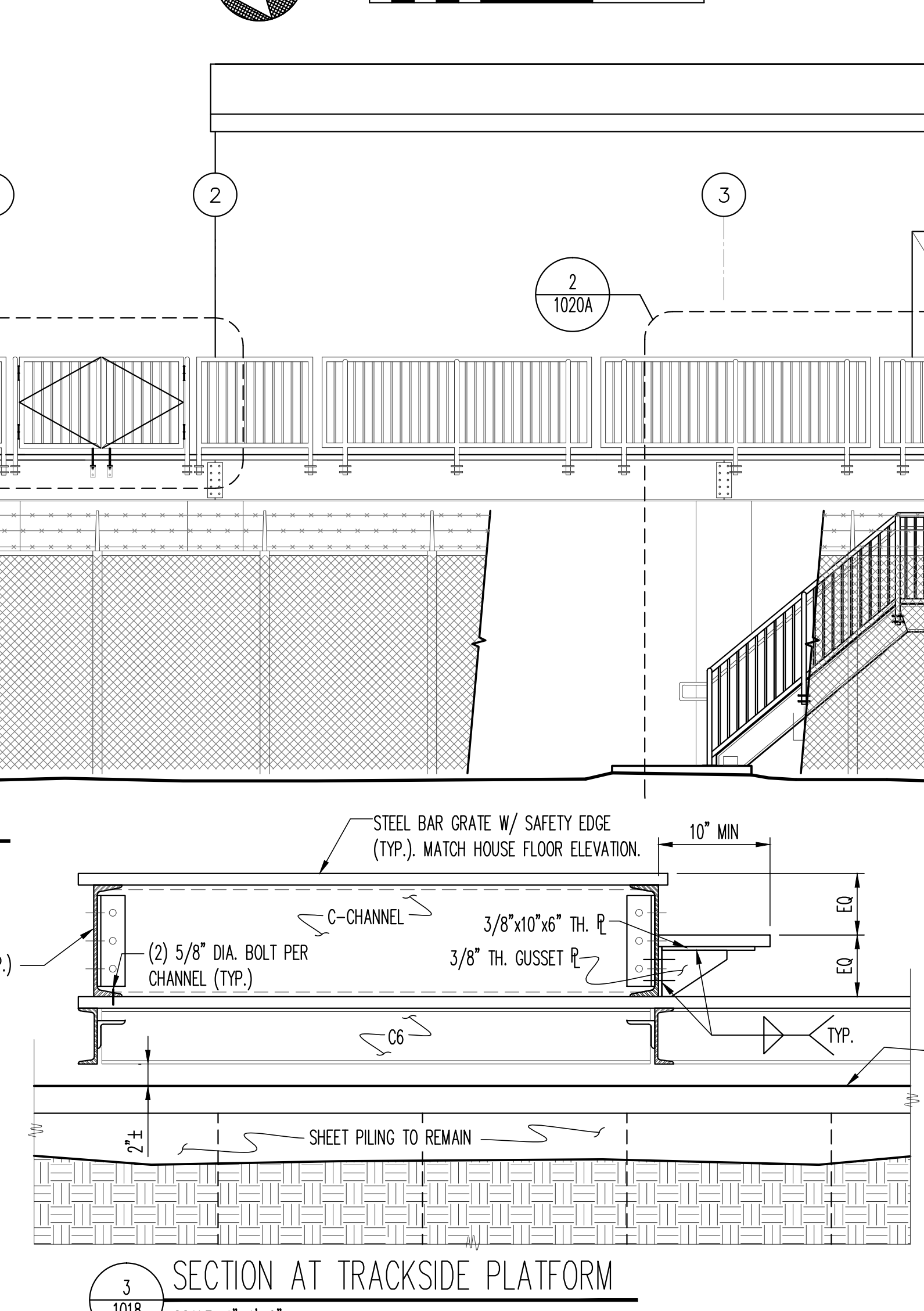
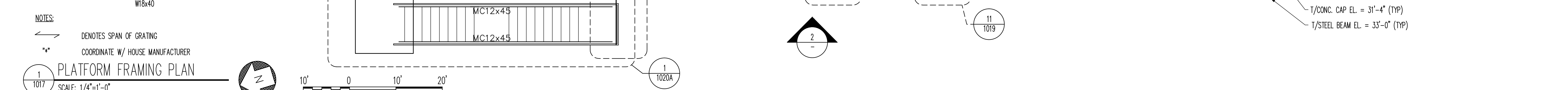
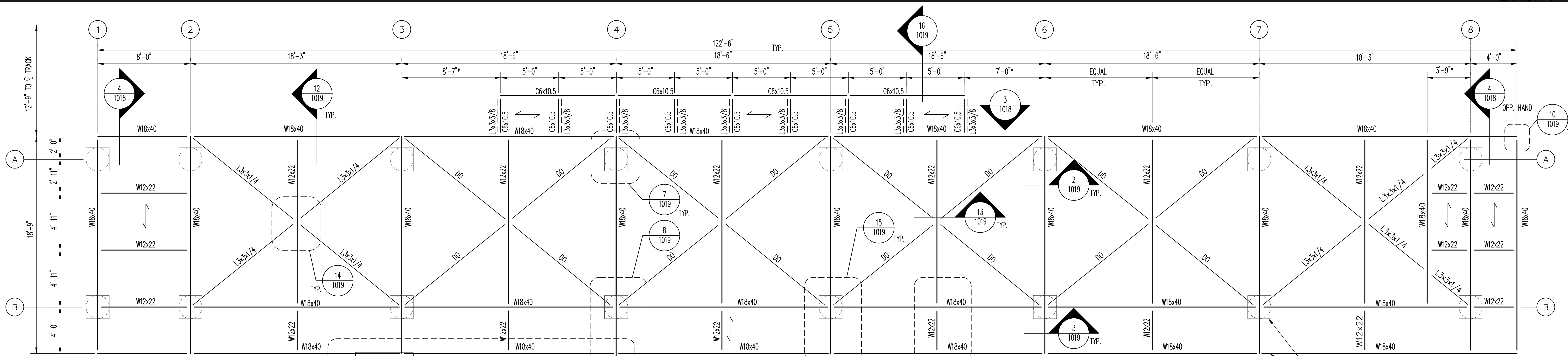
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Tel.: (312)987-9800 Fax.: (312)987-9892

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DRAWN: DC
CHECKED: MK
METRA P.M.: R. CERANT
DATE: JUNE 12, 2017

Metra

ENGINEERING DEPARTMENT
547 W. JACKSON BOULEVARD
CHICAGO, ILLINOIS 60661

LOCATION NAME: RIVERDALE SUBSTATION	CAD FILE NUMBER: SS-17.5-1017A.DGN
TITLE: LANDSCAPING PLAN, DETAILS, SCHEDULES AND NOTES	SCALE: AS SHOWN DISTRICT: MED PROJECT NO. GW4254-57102002 SHEET NO. SS-17.5-1017A MILE POST NO. 17.5



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REV	DATE	BY	APP	DESCRIPTION

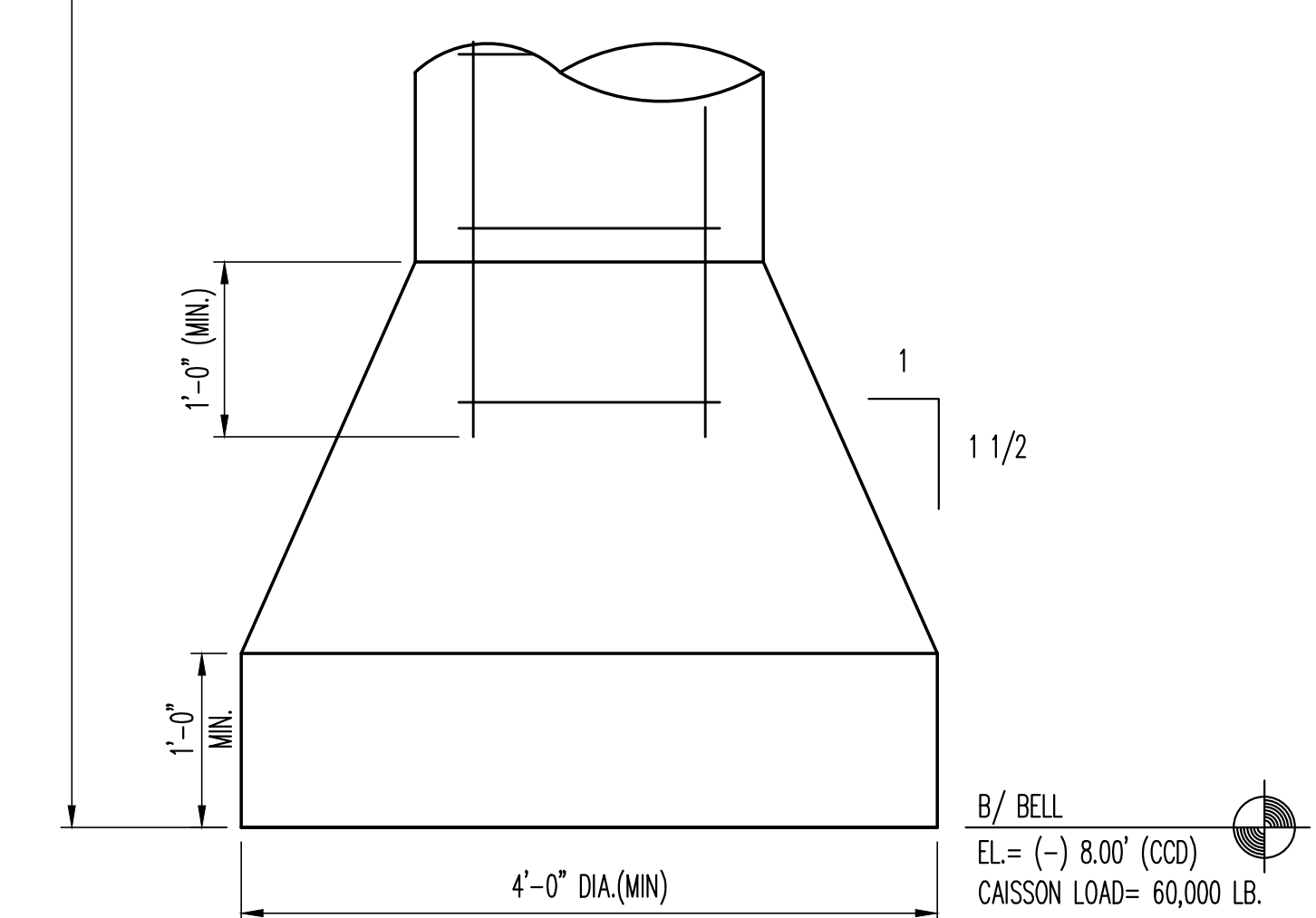
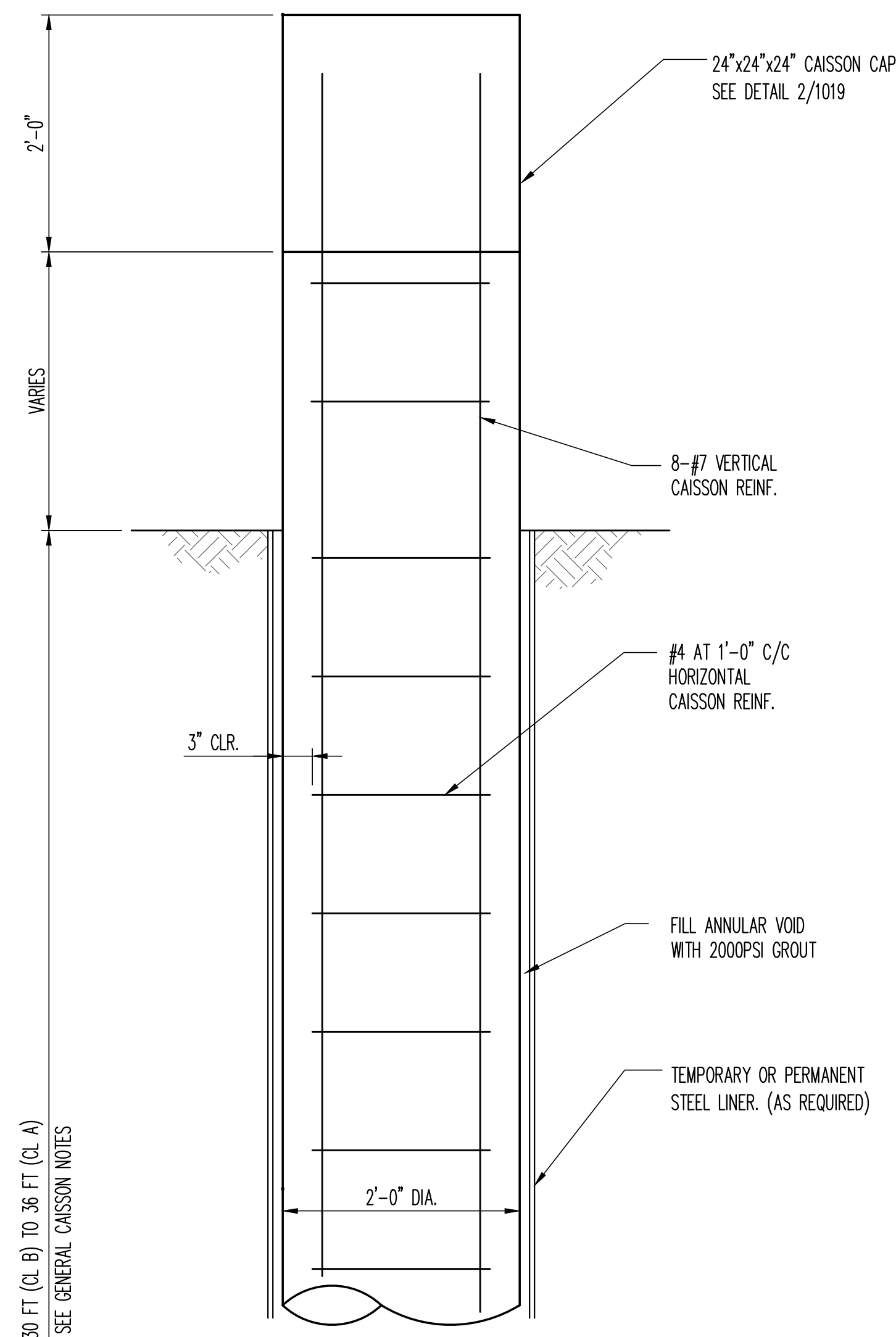
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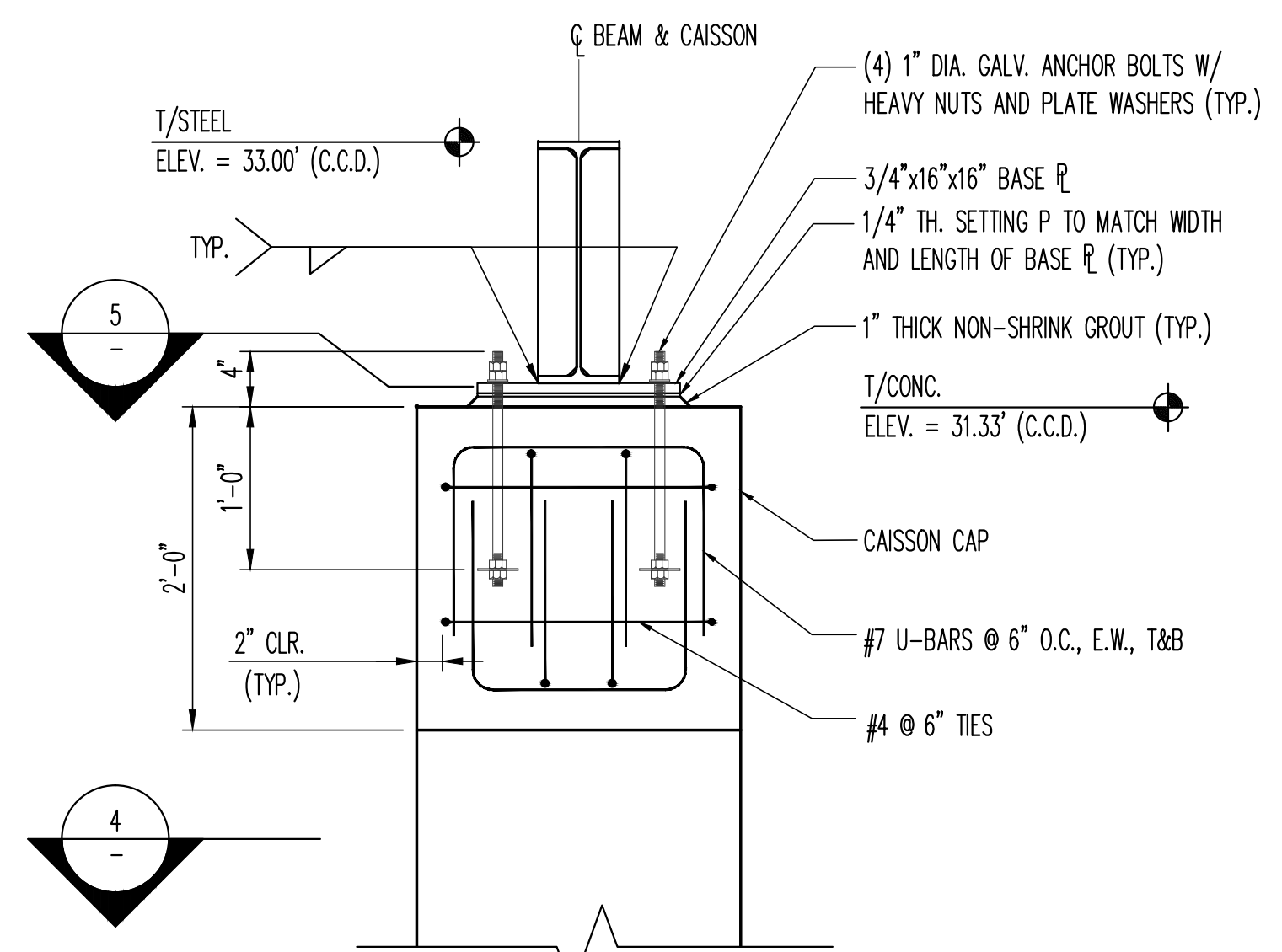
DESIGNED: EG
 DRAWN: DC
 CHECKED: MK
 METRA P.M.: R. CERANT
 DATE: JUNE 12, 2017

LOCATION NAME: **RIVERDALE SUBSTATION**
 TITLE: **FRAMING PLAN**

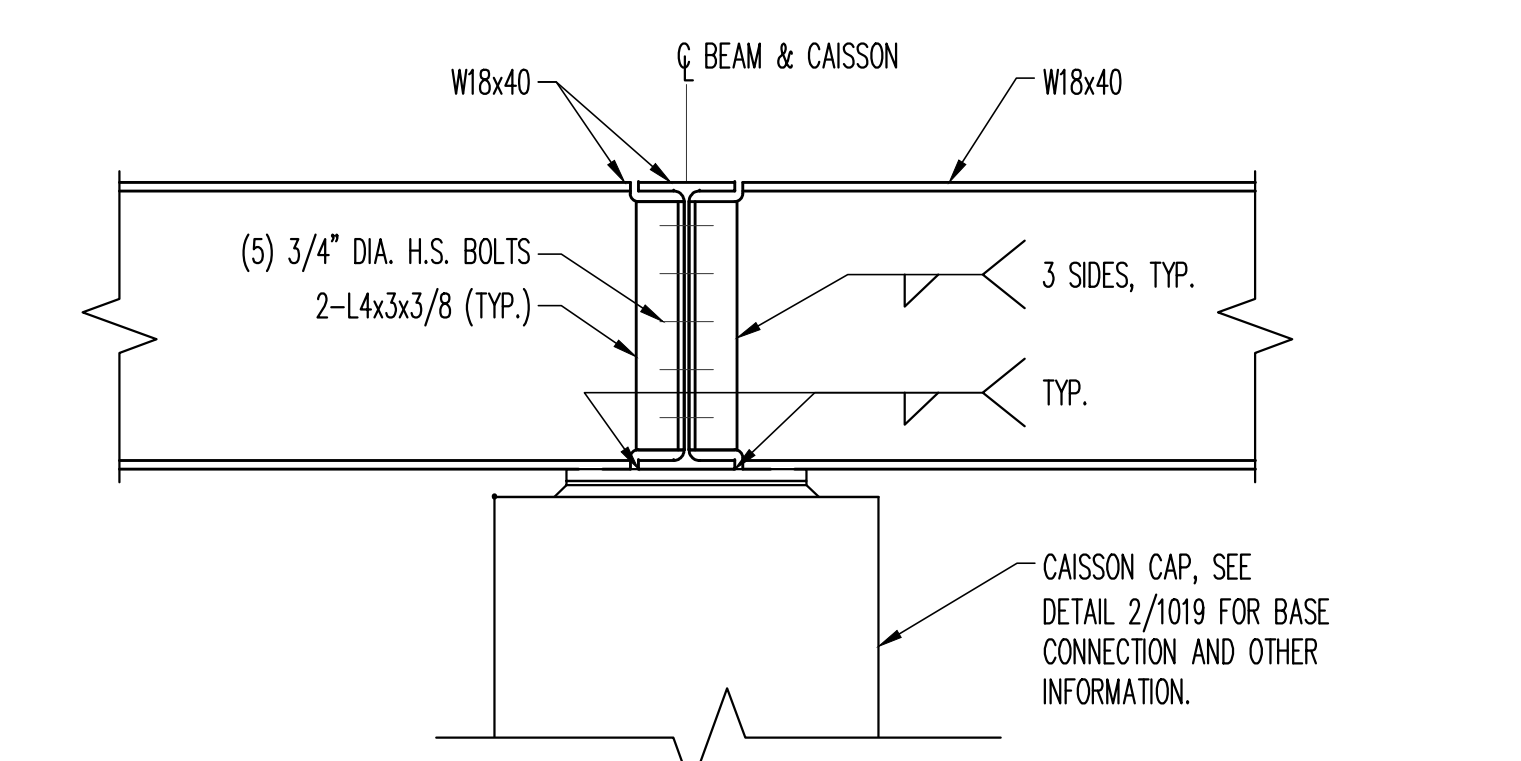
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 SCALE: AS SHOWN
 PROJECT NO. GW4254-57102002
 MILE POST NO. 17.5
 DISTRICT: MED
 SHEET NO. **SS-17.5-1018**



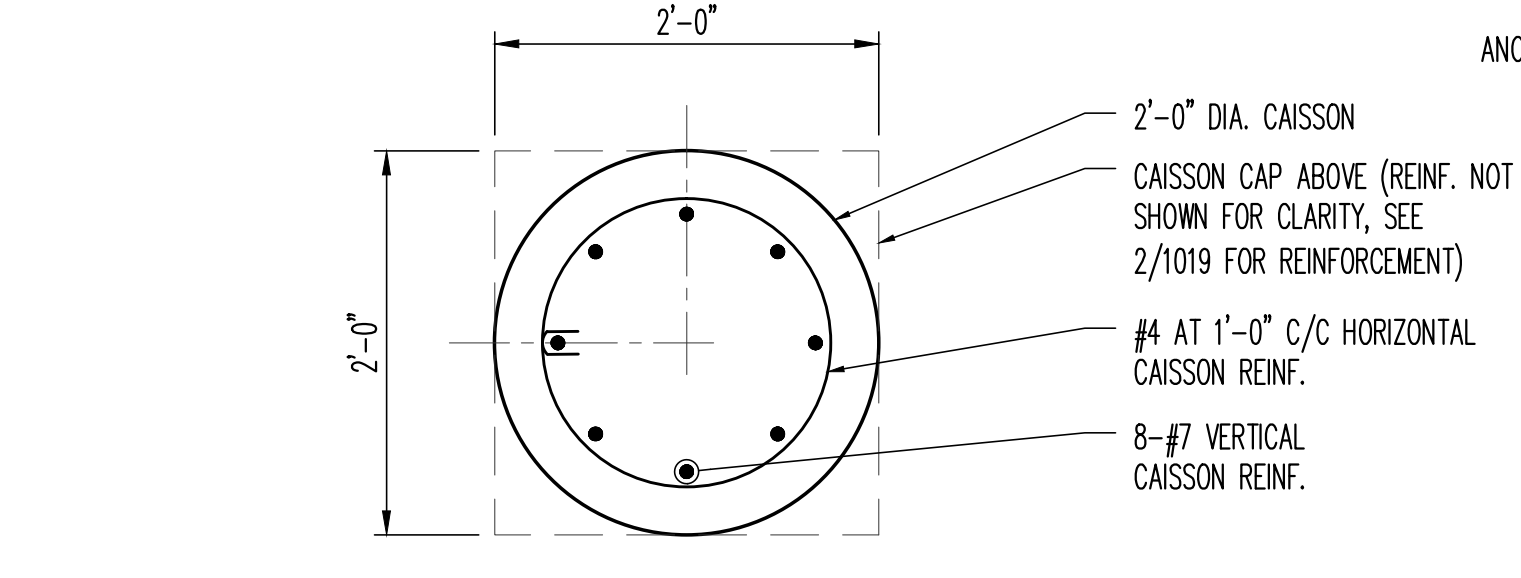
1 TYPICAL CAISSON REINFORCING DETAIL
SCALE: 1"=1'-0"



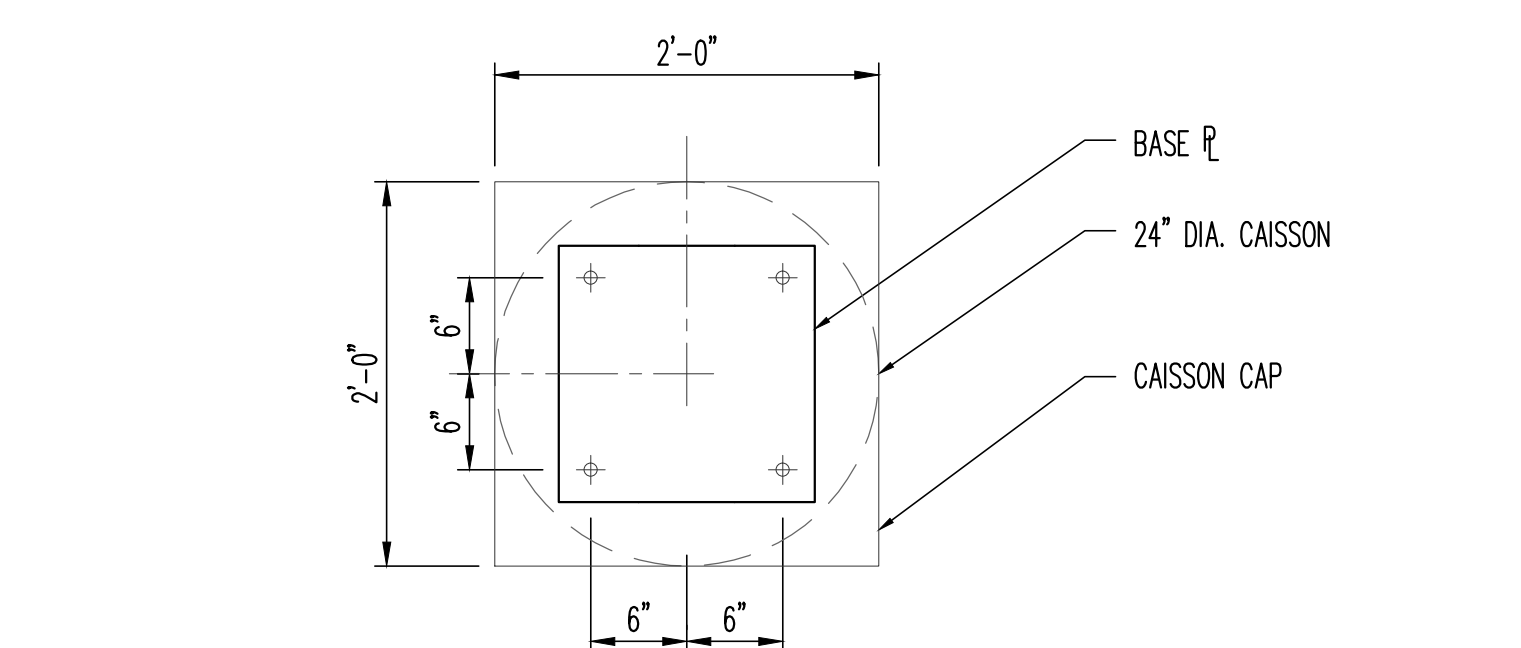
2 COLUMN LINE "A" CAISSON CAP REINFORCING DETAIL
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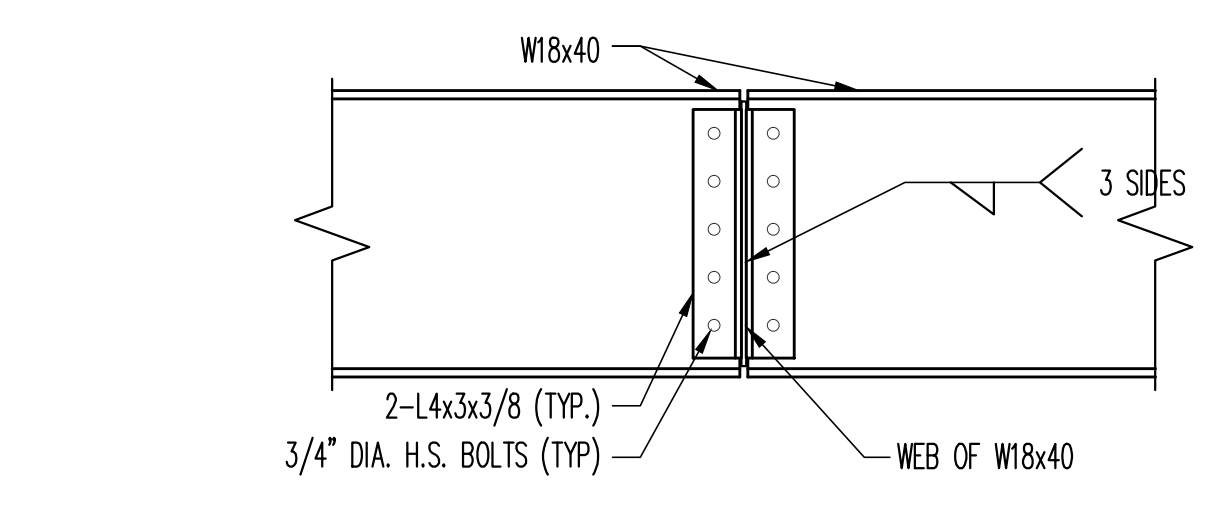
3 COLUMN LINE "B" CAISSON CAP REINFORCING DETAIL
SCALE: 1"=1'-0"



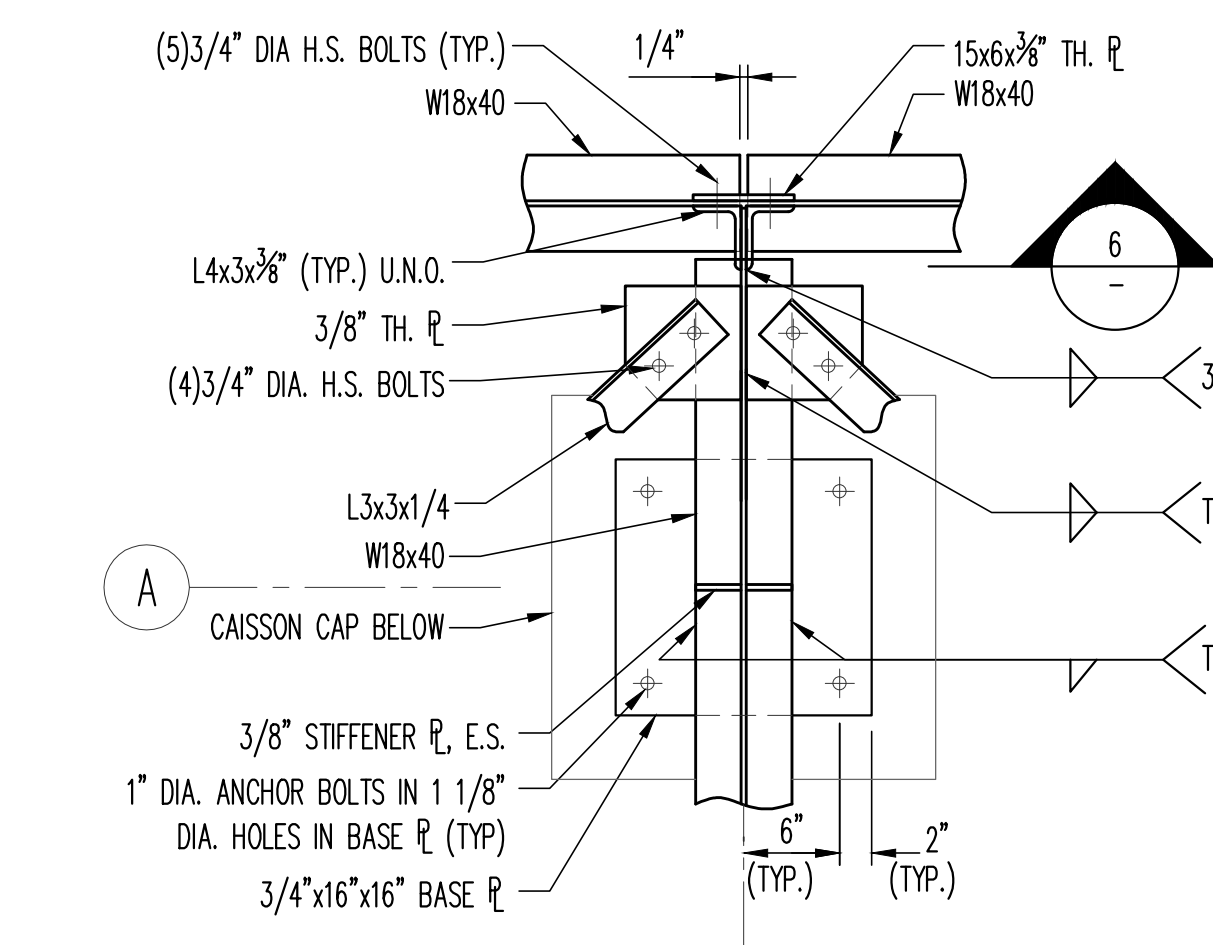
4 TYPICAL CAISSON REINFORCING DETAIL
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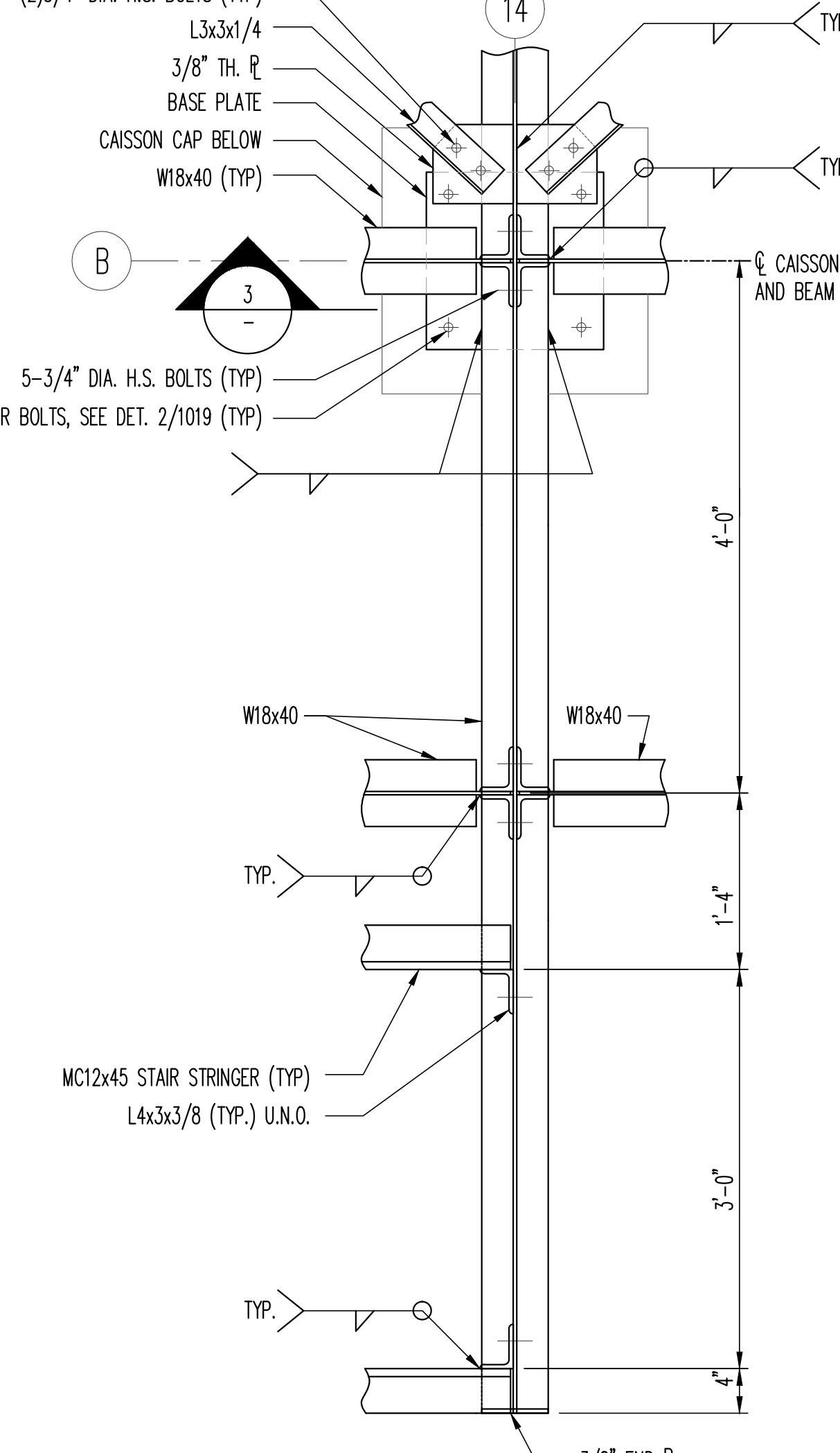
5 TYPICAL BASE PLATE DETAIL
SCALE: 1"=1'-0"



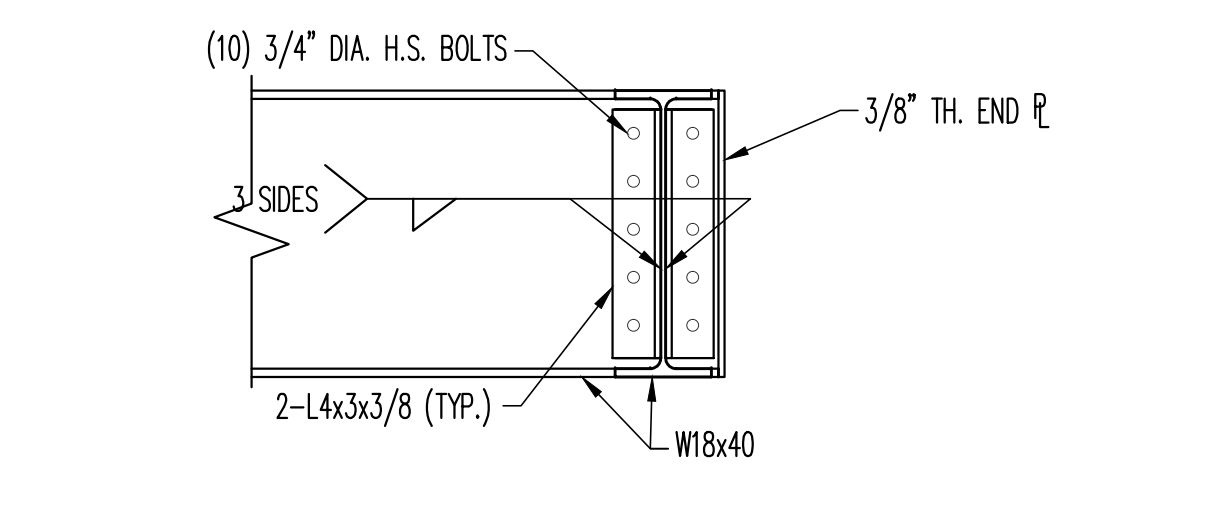
6 SECTION
SCALE: 1"=1'-0"



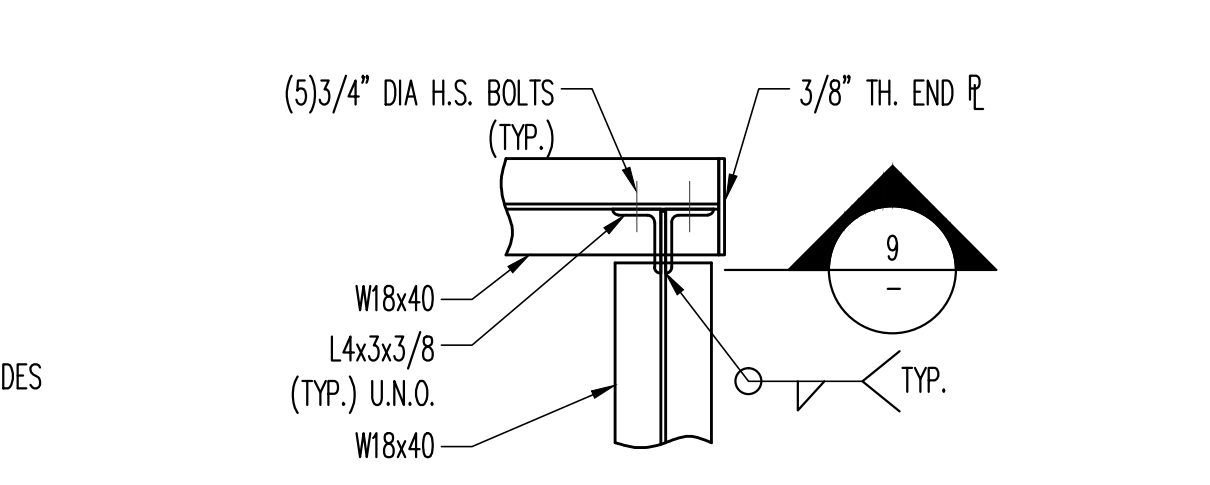
7 TYPICAL DETAIL AT COLUMN LINE "A"
SCALE: 1"=1'-0"



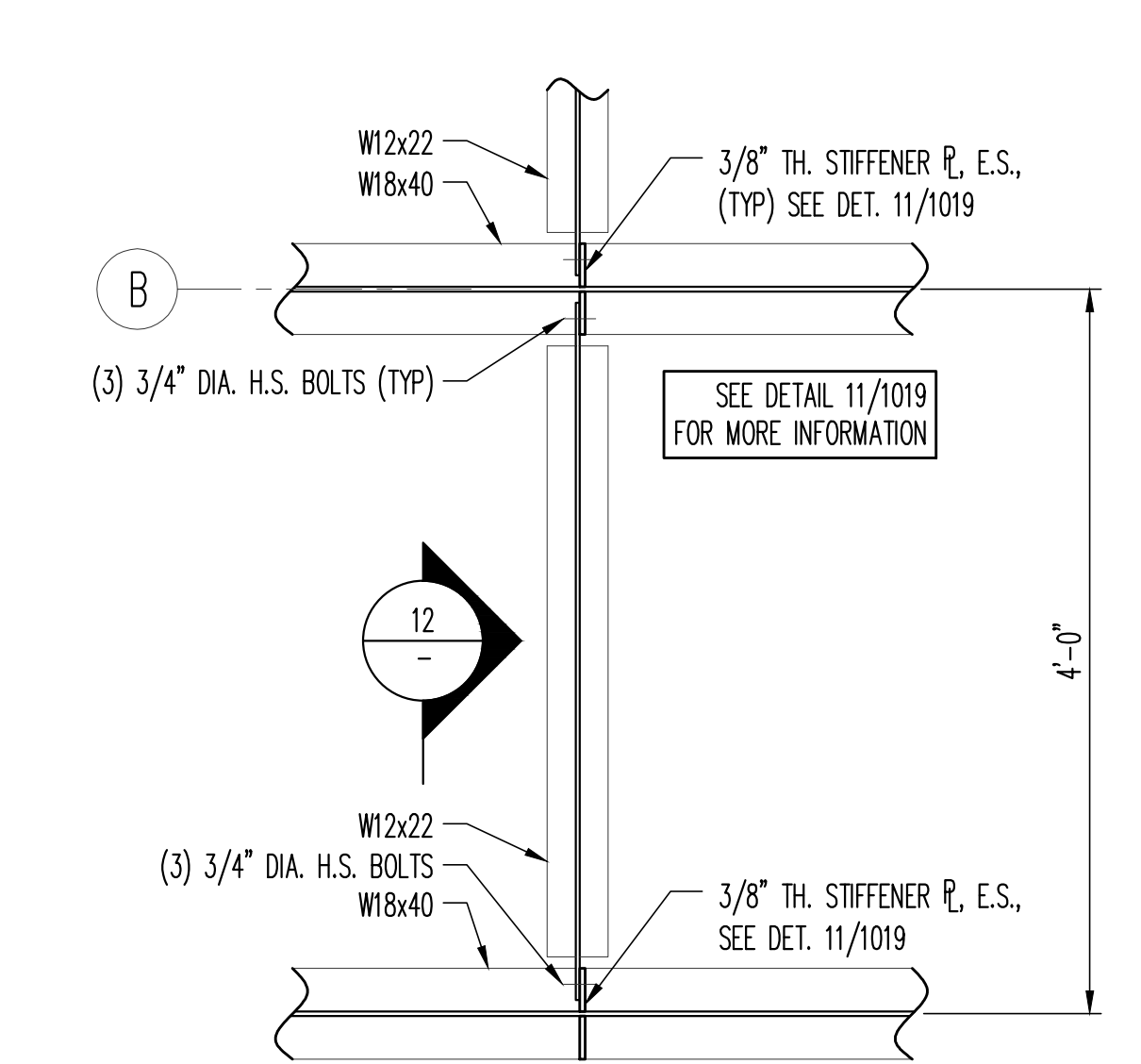
8 DETAIL AT COLUMN LINE "4"
SCALE: 1"=1'-0"



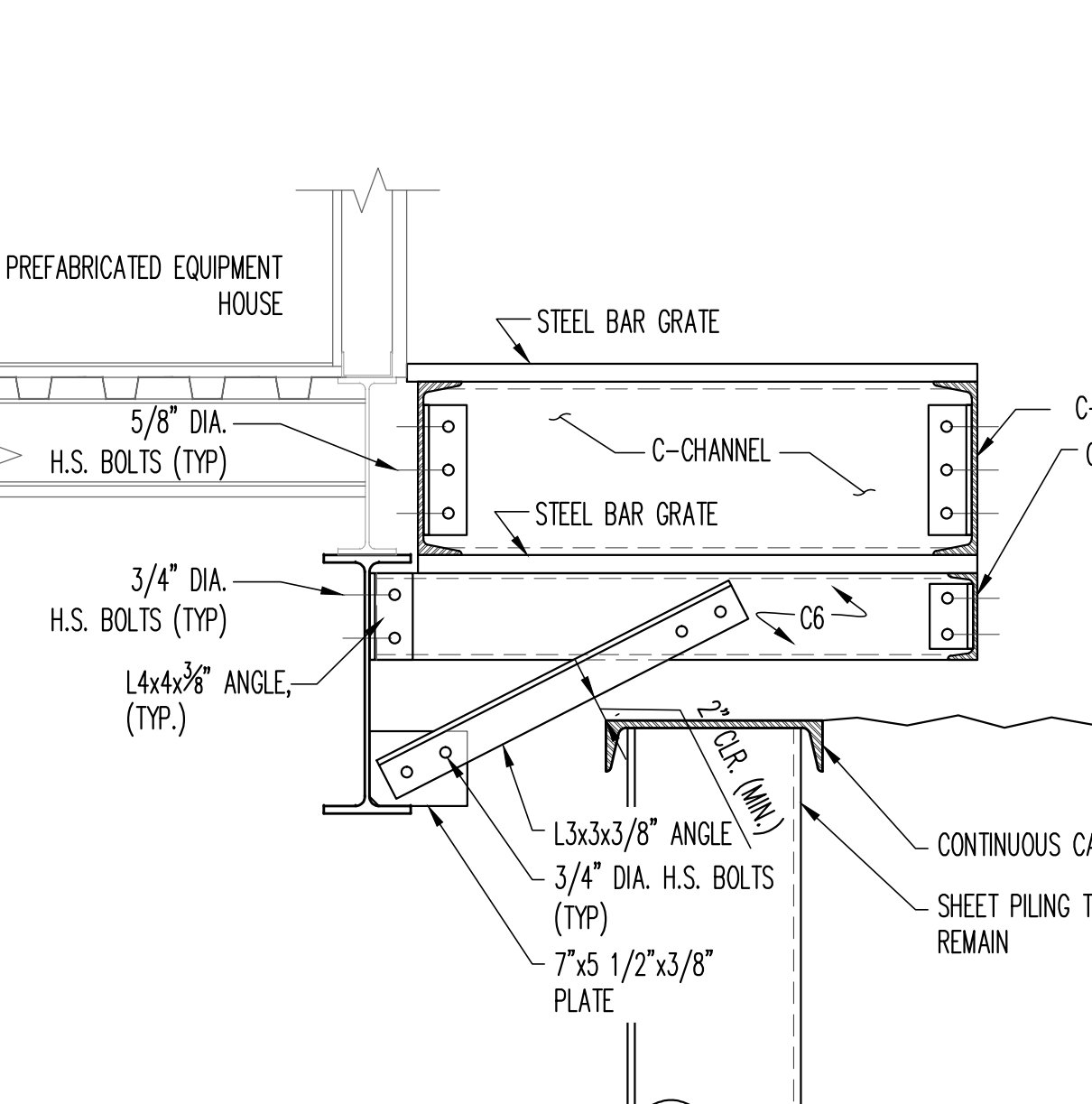
9 SECTION
SCALE: 1"=1'-0"



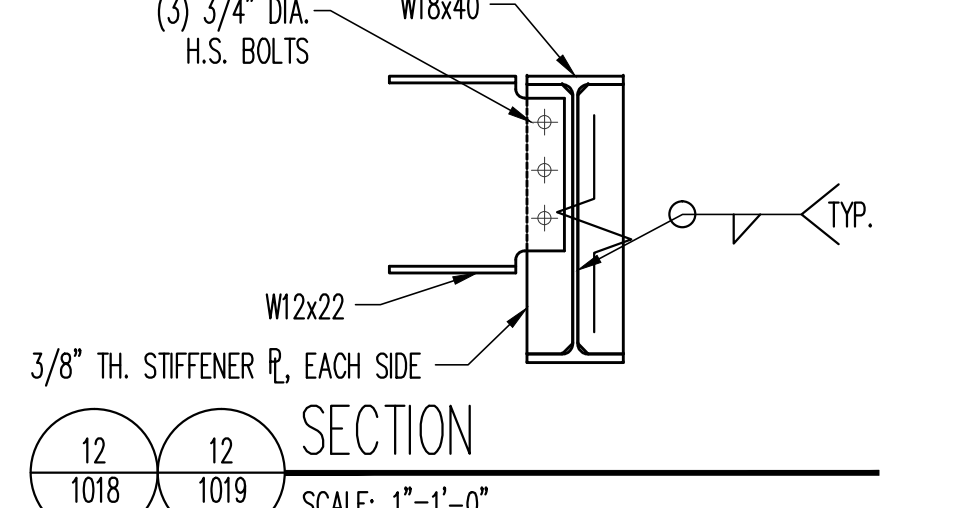
10 DETAIL
SCALE: 1"=1'-0"



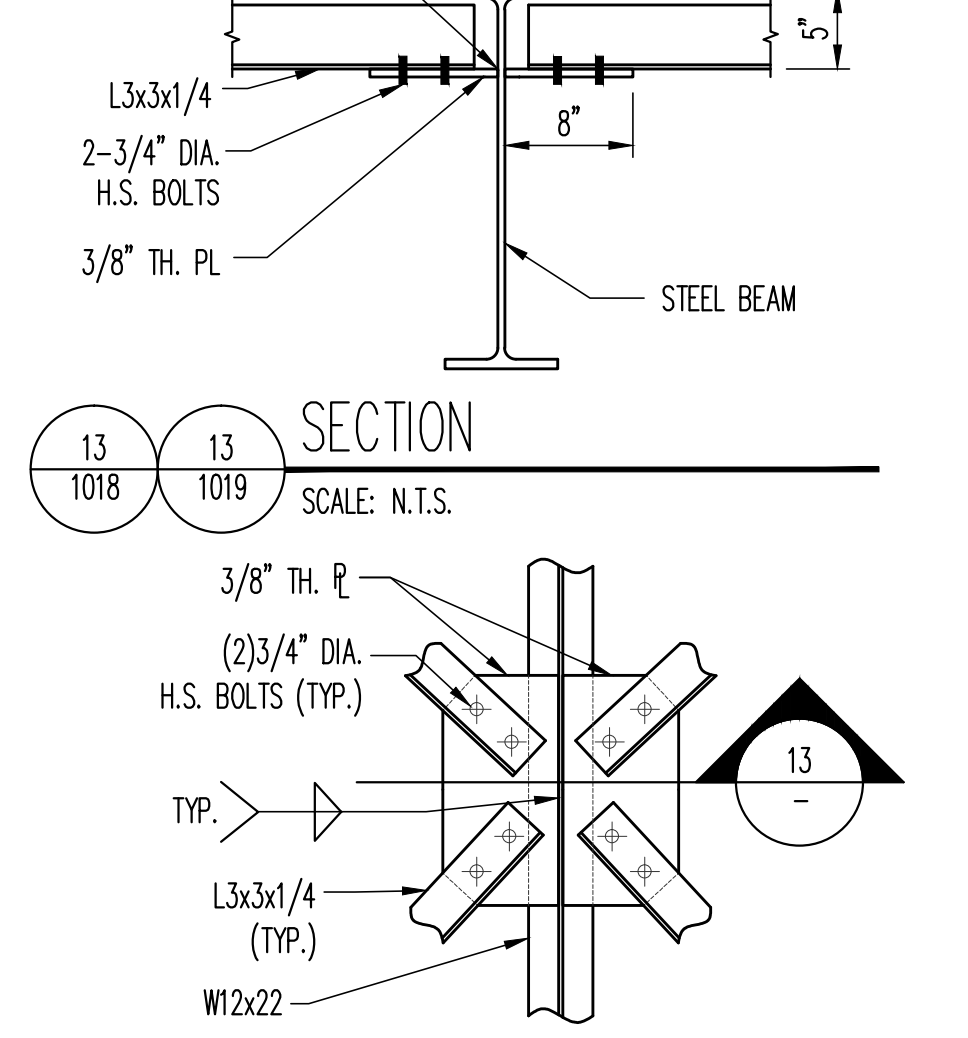
11 DETAIL
SCALE: 1"=1'-0"



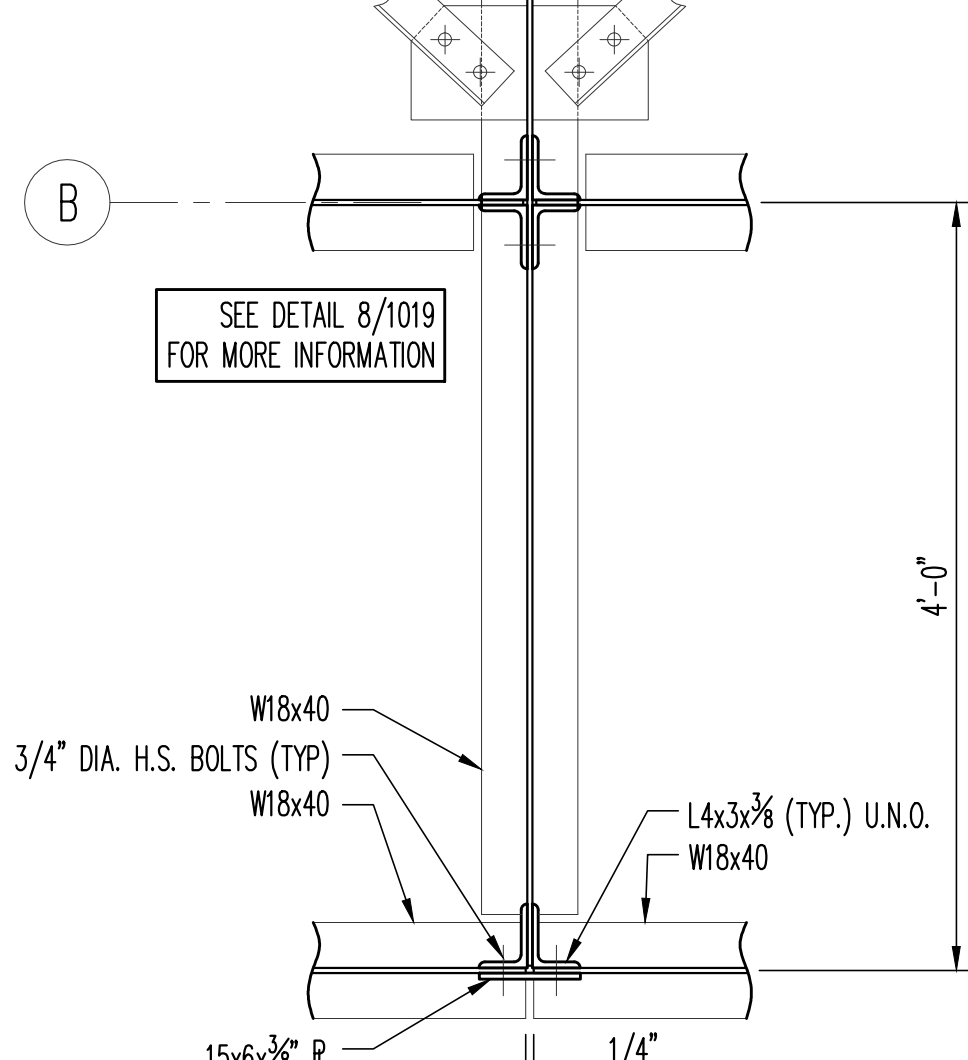
16 SECTION AT TRACKSIDE PLATFORM
SCALE: 1"=1'-0"



12 SECTION
SCALE: 1"=1'-0"



13 TYPICAL BRACING DETAIL
SCALE: N.T.S.



14 DETAIL
SCALE: 1"=1'-0"

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CHICAGO, ILLINOIS 60661

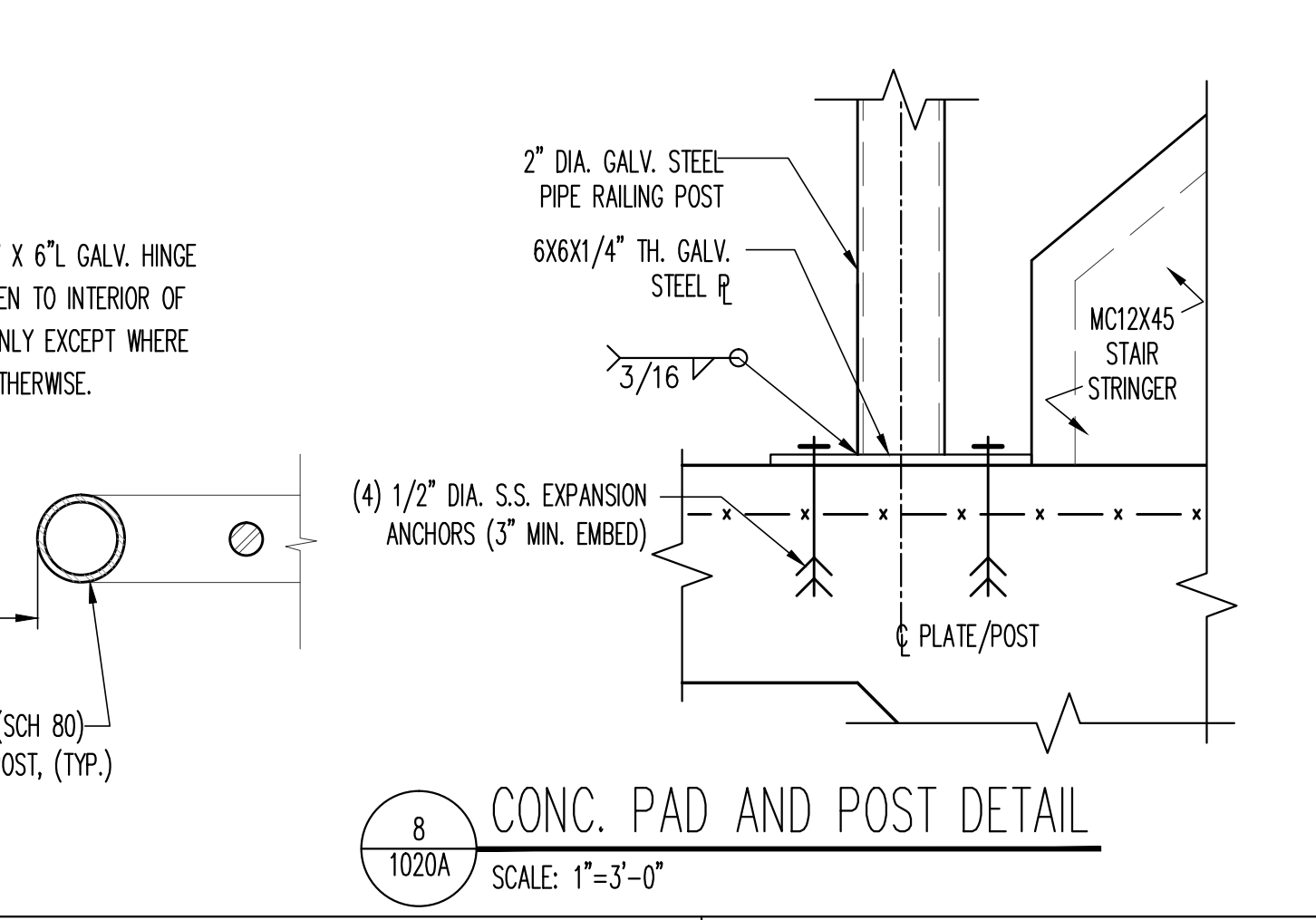
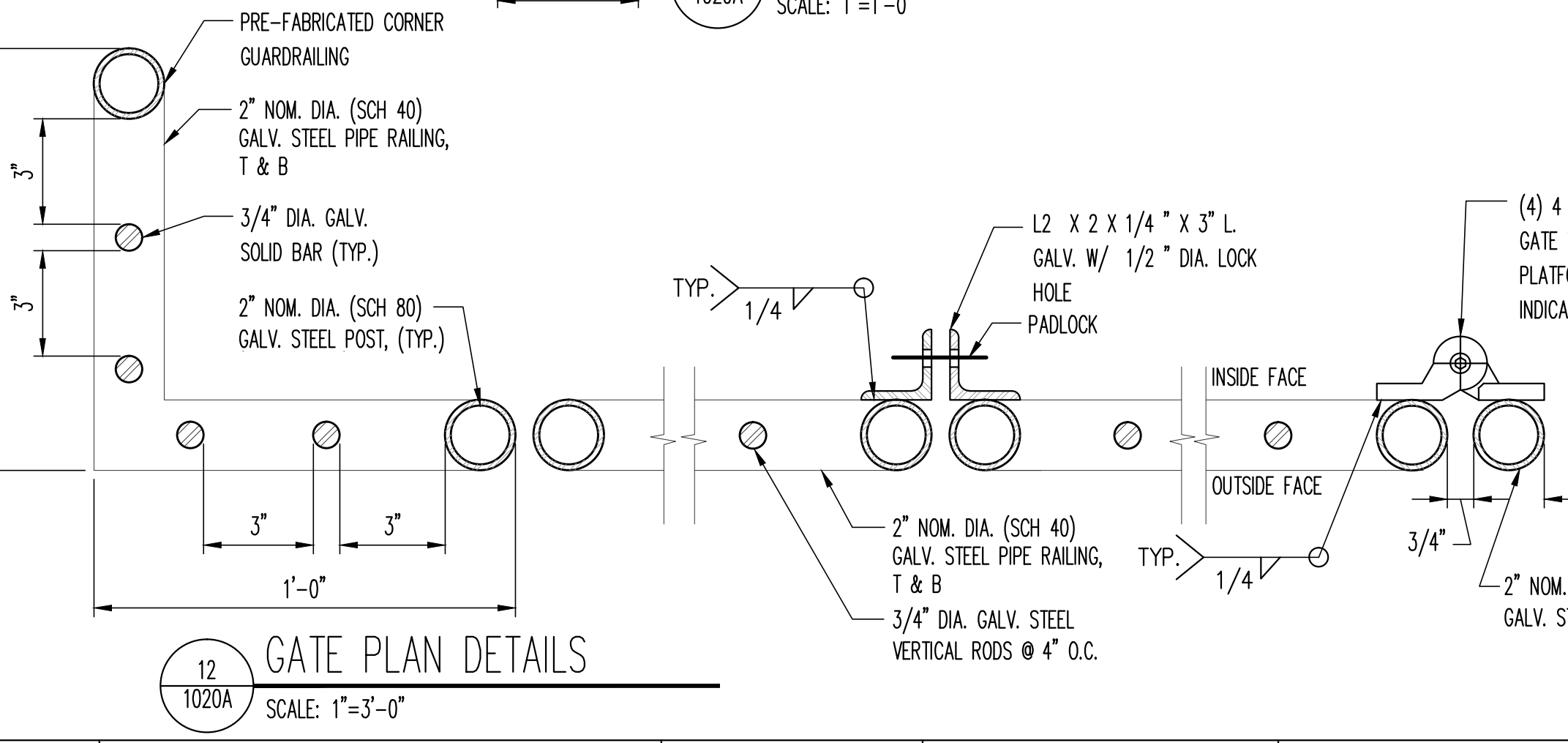
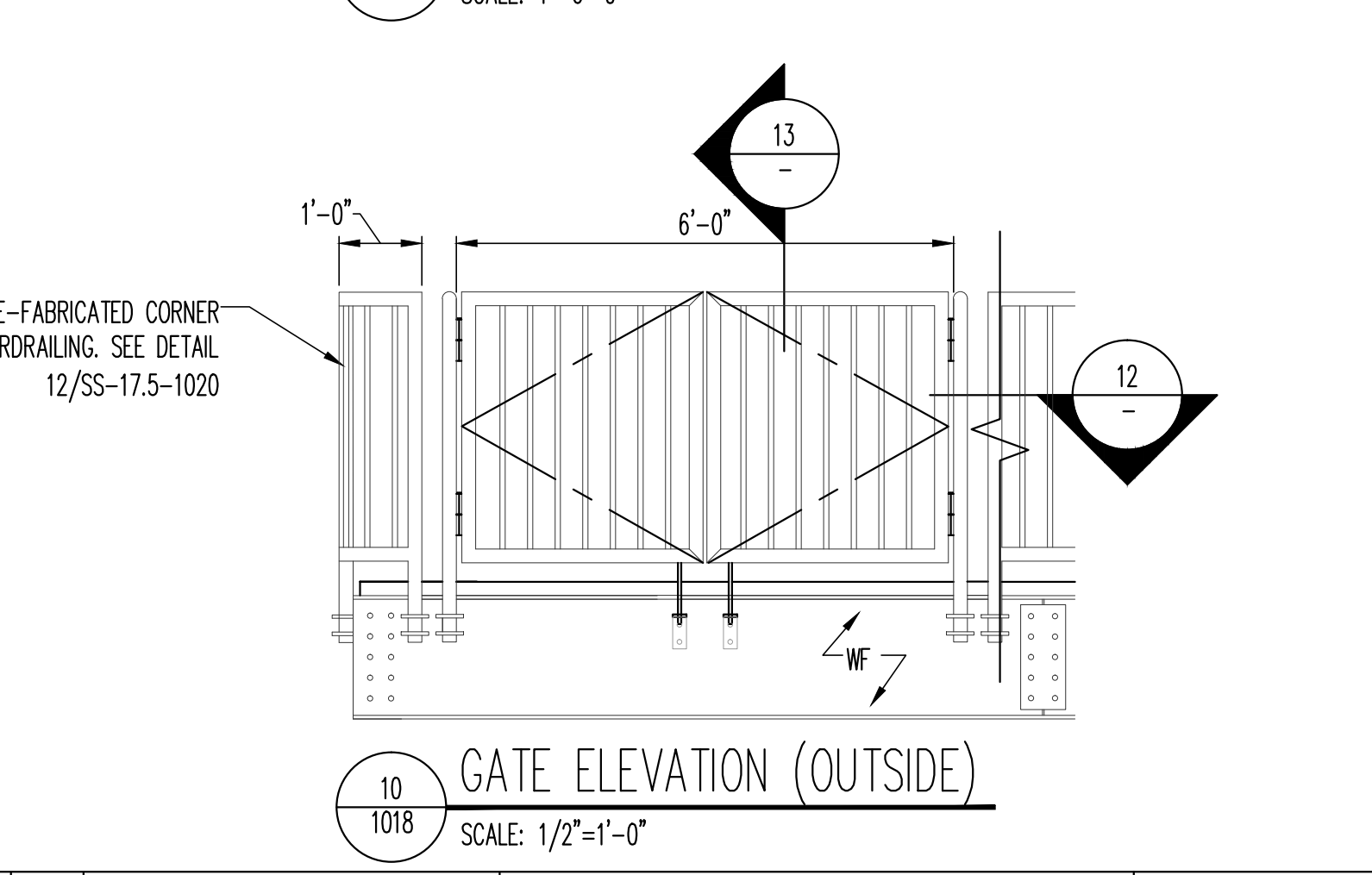
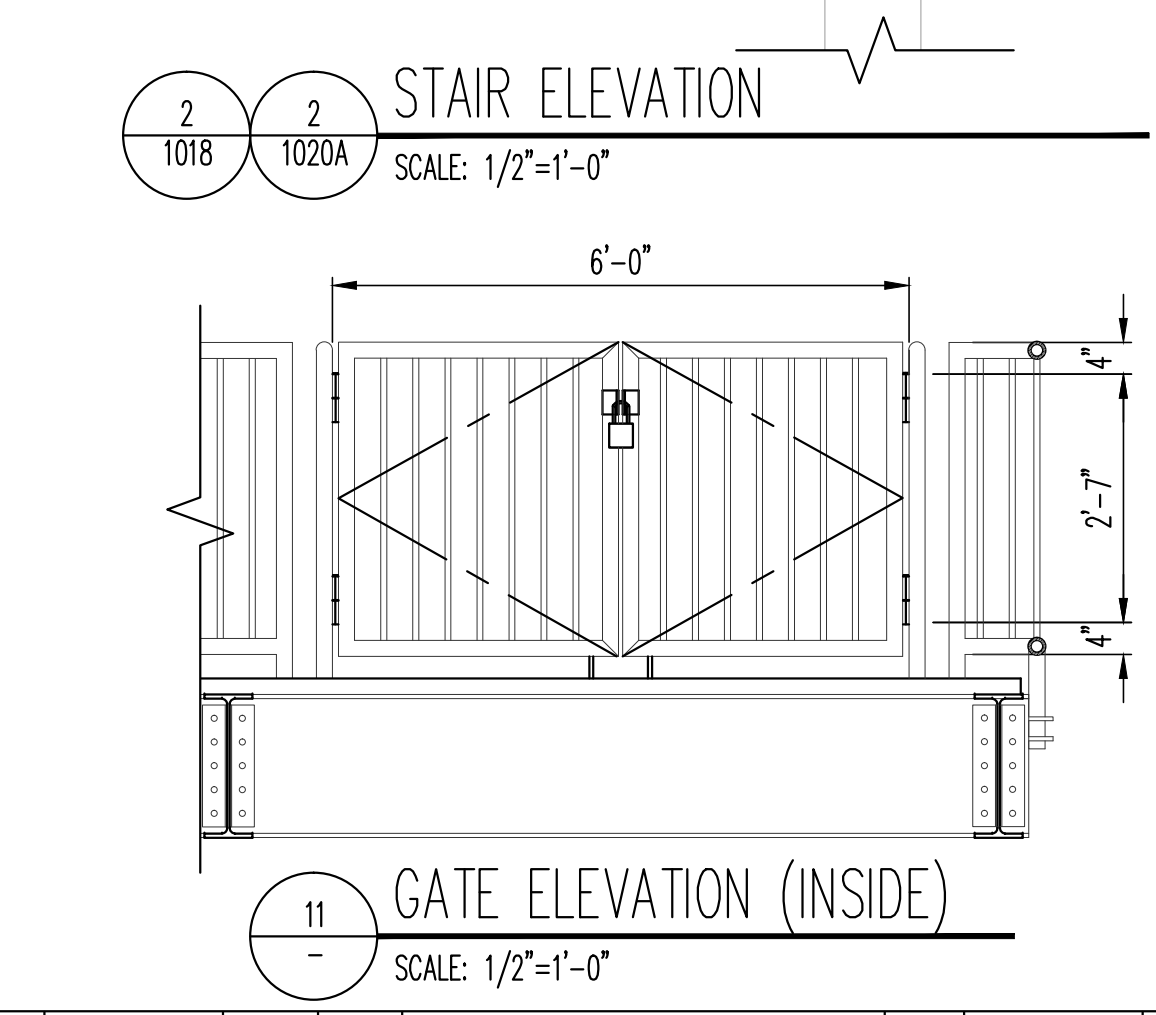
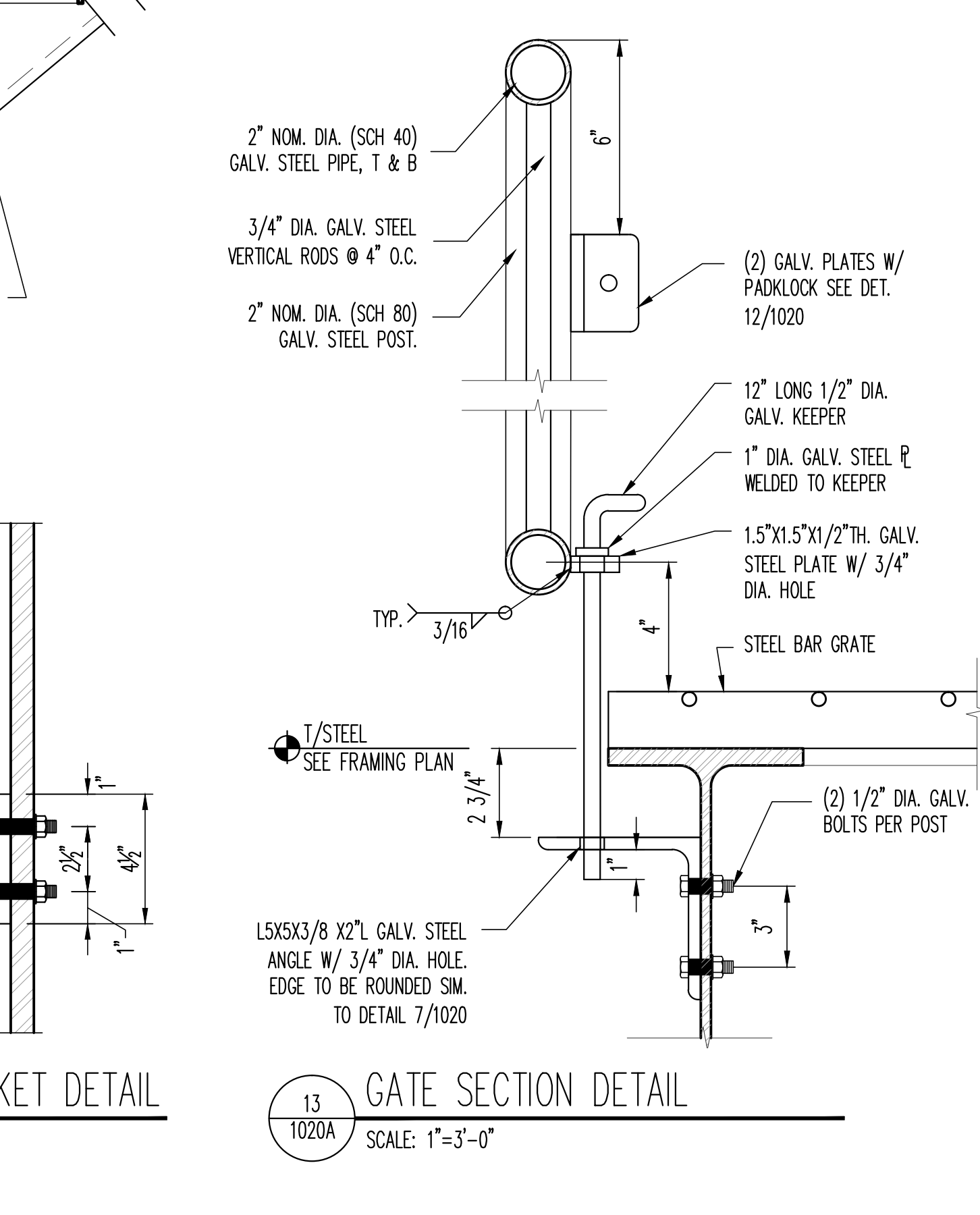
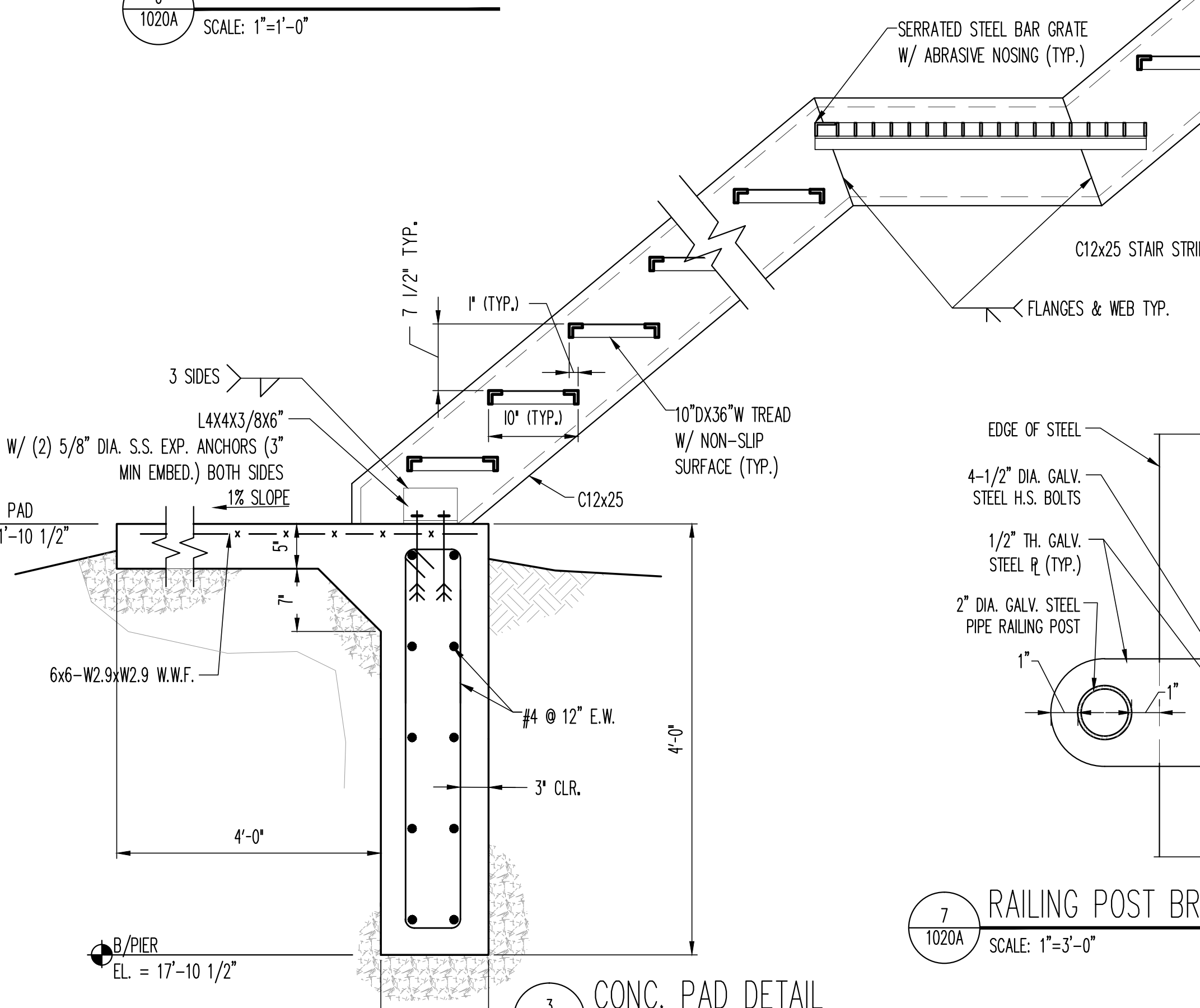
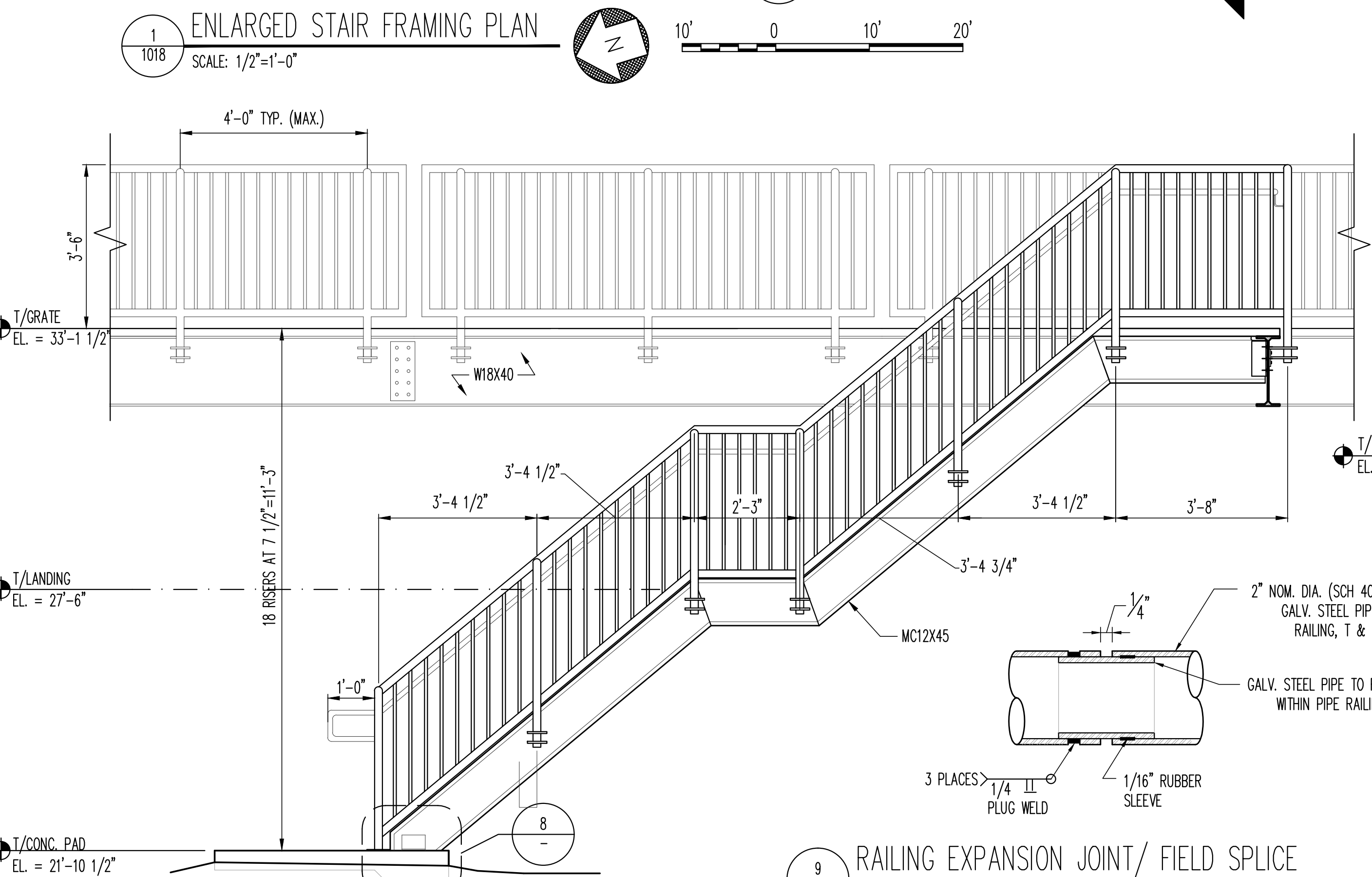
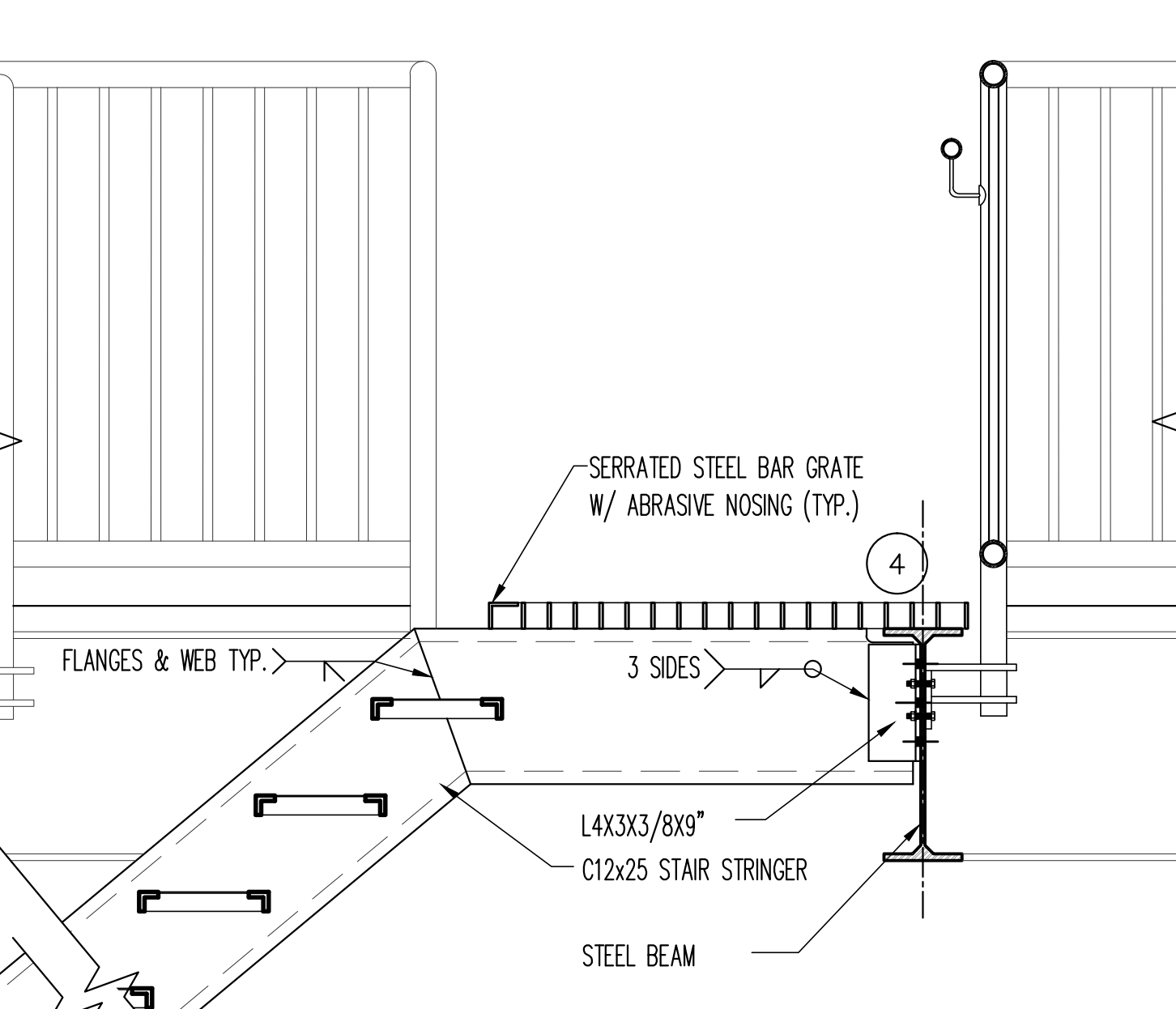
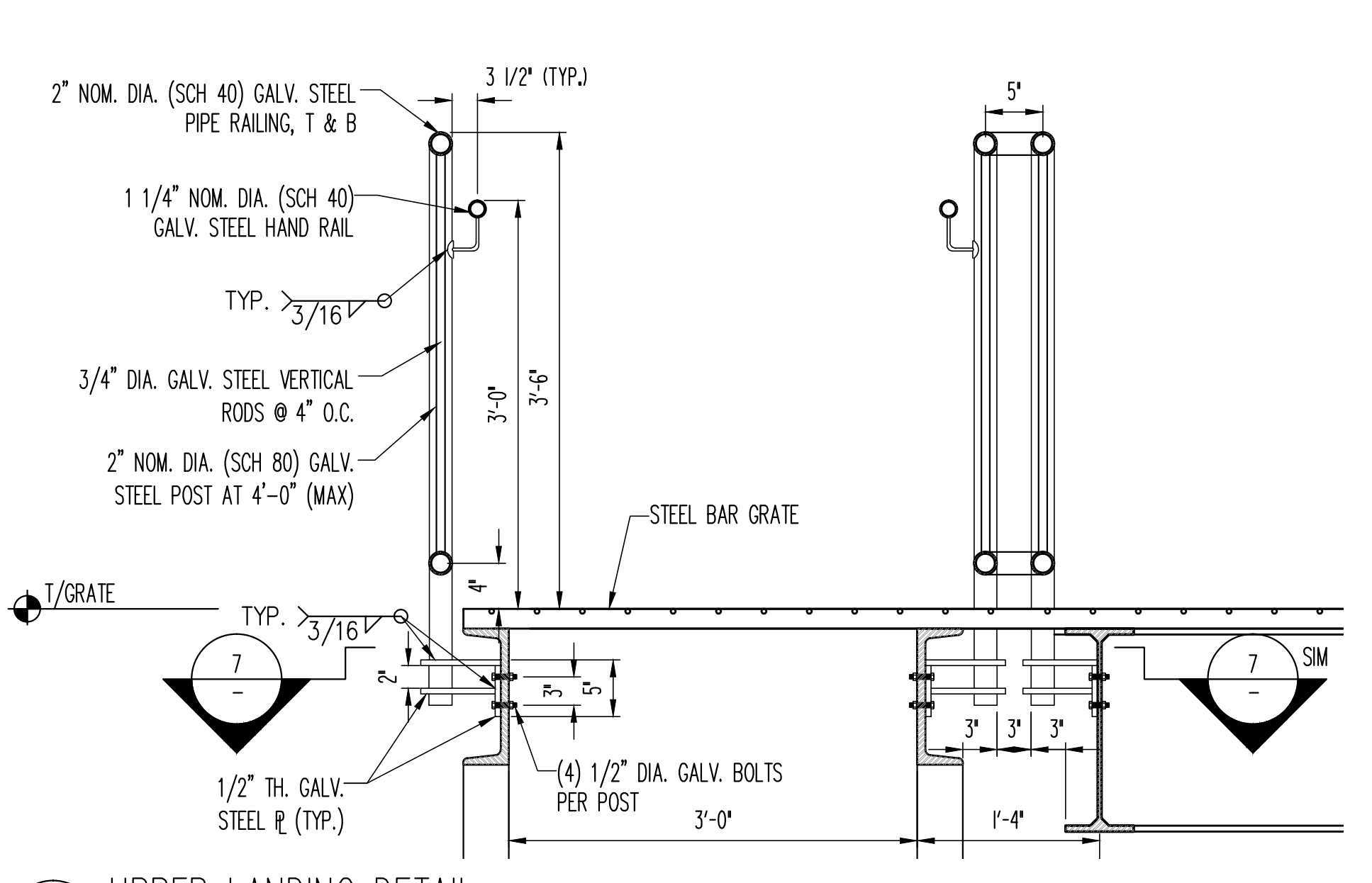
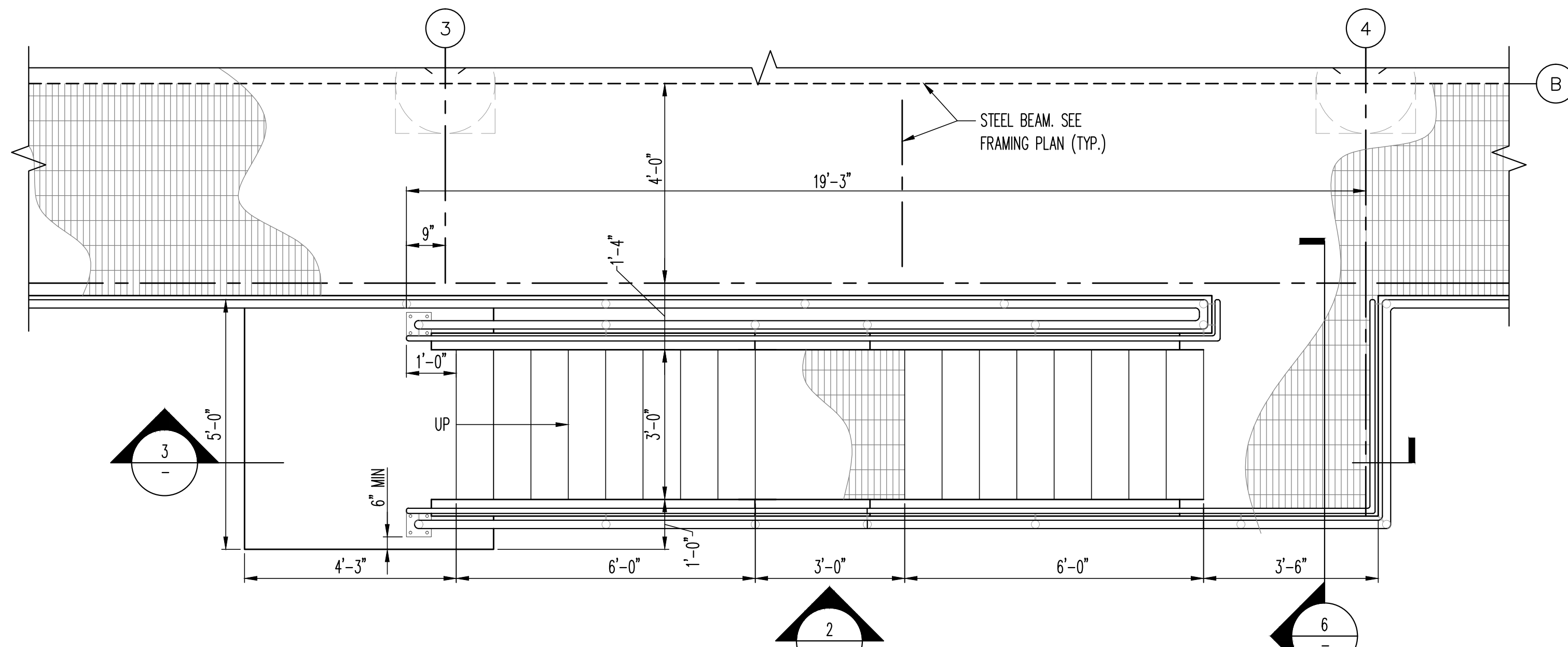
LOCATION NAME: RIVERDALE SUBSTATION

TITLE: FOUNDATION AND FRAMING DETAILS

CAD FILE NUMBER: SS-17.5-101.DGN

SCALE: AS SHOWN
PROJECT NO. GW4254-57102002
MILE POST NO. 17.5

DISTRICT: MED
SHEET NO. SS-17.5-101



PRINTED ON: 07/28/2017

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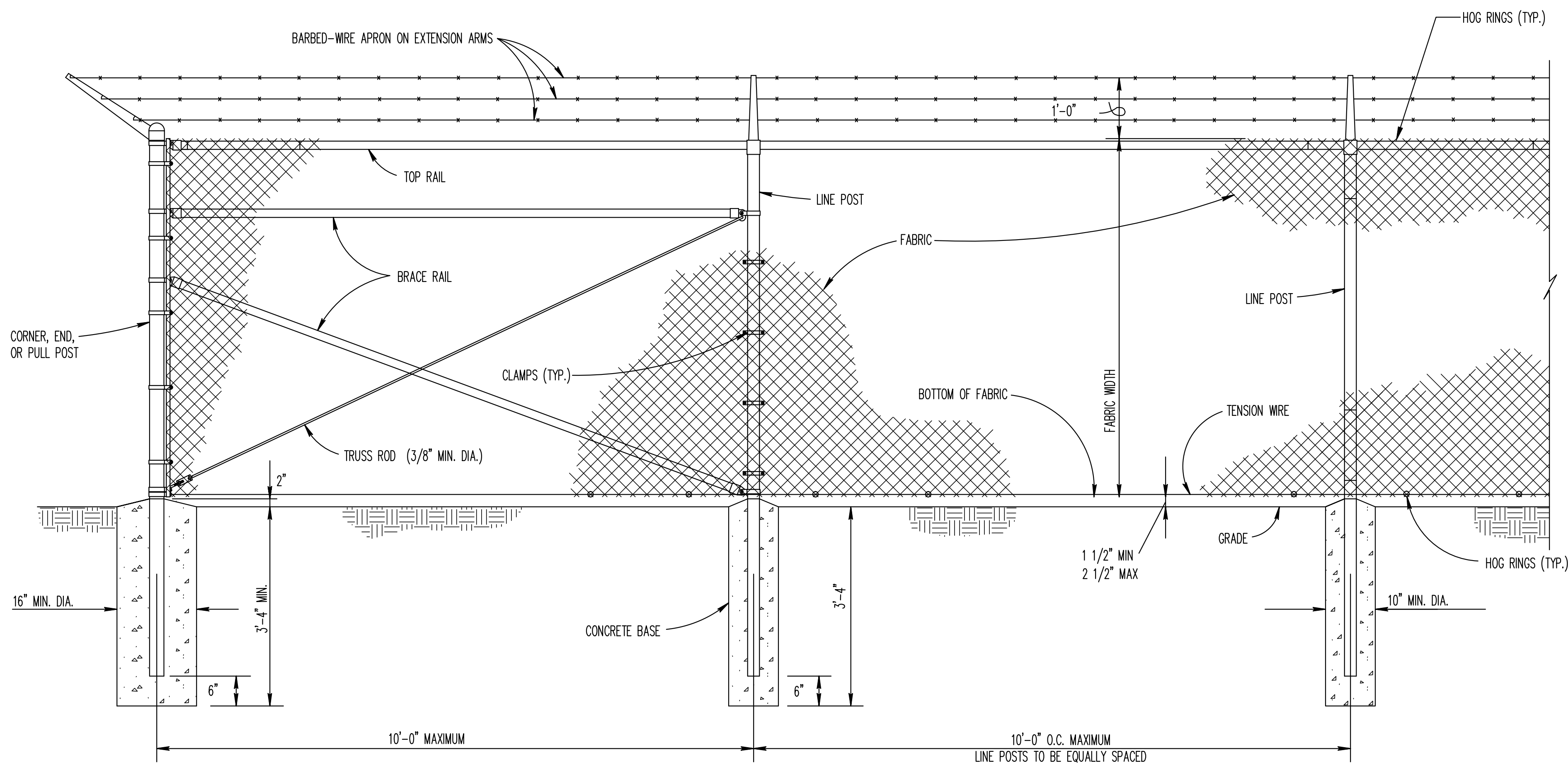
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 ARCHITECTS ■ ENGINEERS

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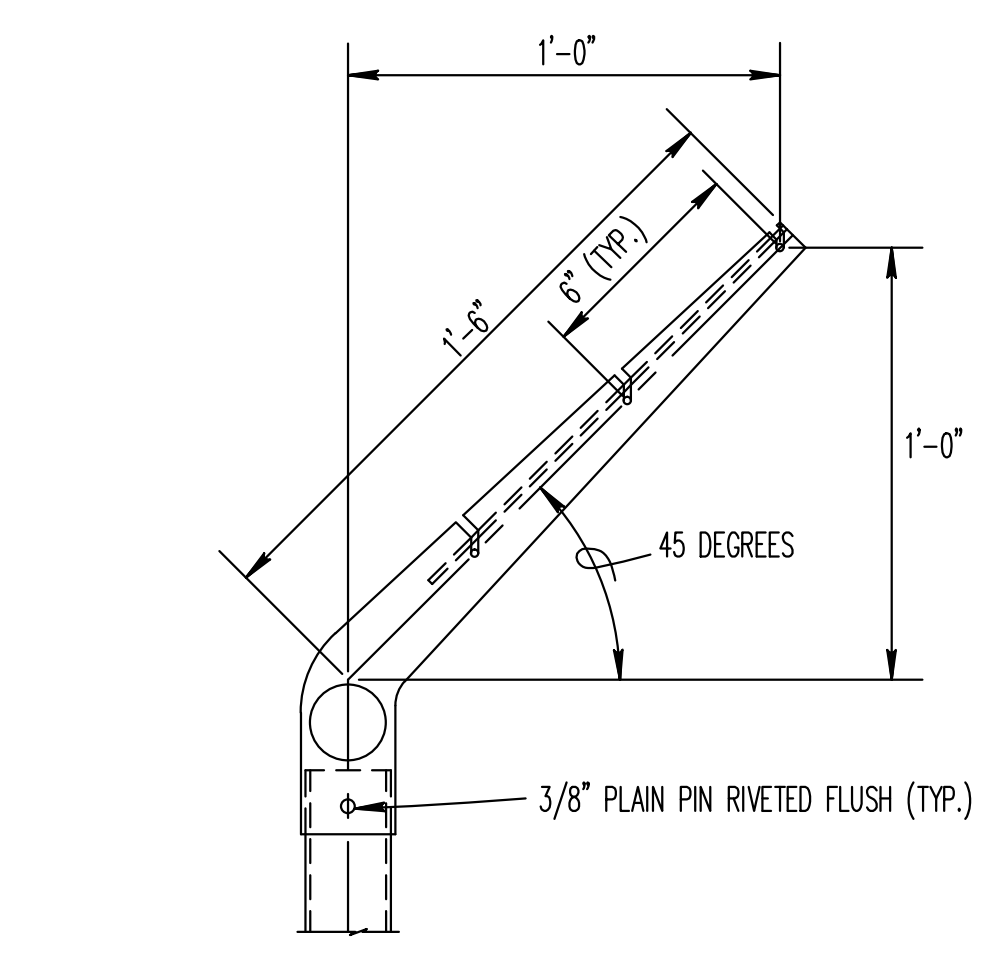
DESIGNED: EG
 DRAWN: DC
 CHECKED: MK
 METRA P.M.: R. CERANT
 DATE: JUNE 12, 2017

LOCATION NAME: **RIVERDALE SUBSTATION**
 TITLE: **STAIR, RAILING AND GATE DETAILS**

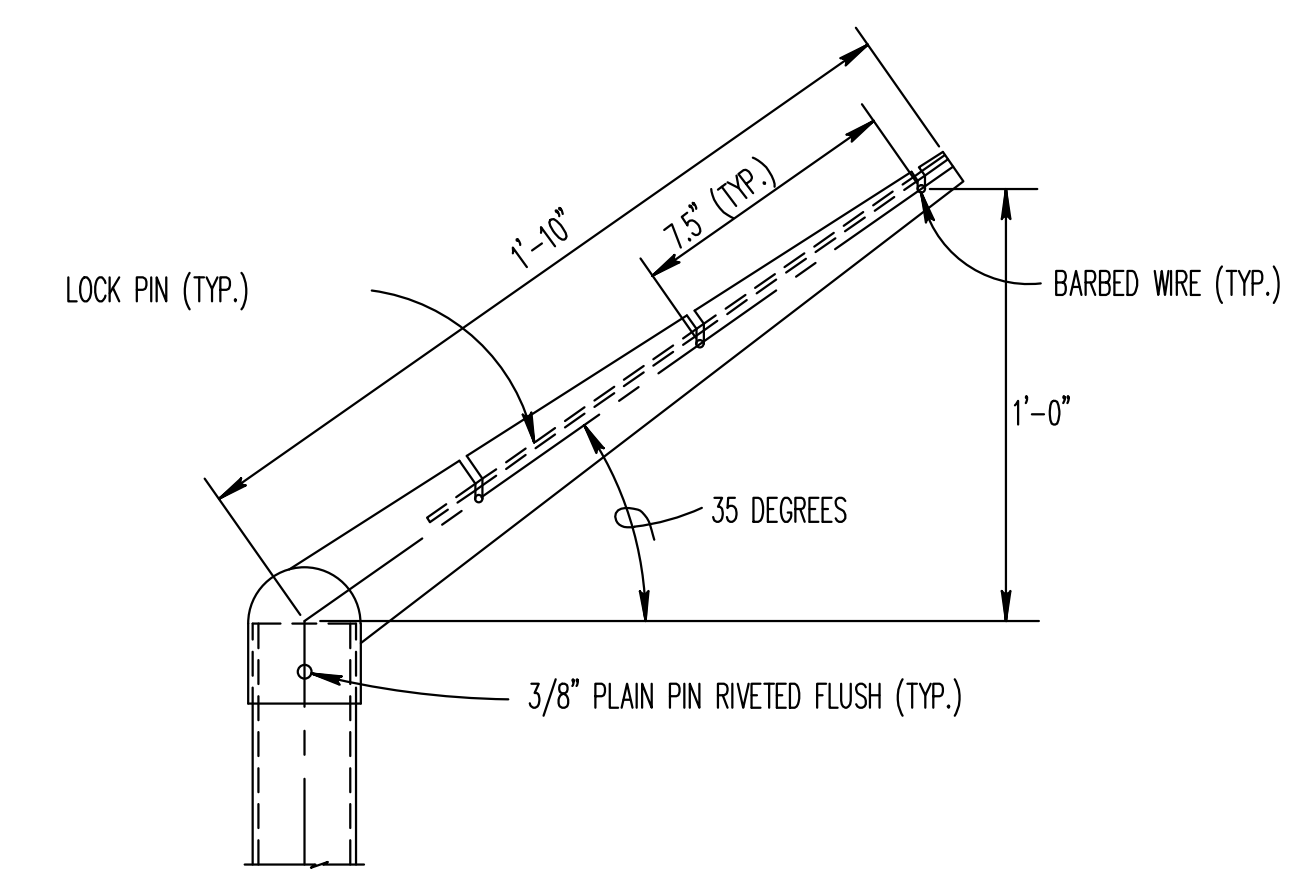
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 SCALE: AS SHOWN
 PROJECT NO. GW4254-57102002
 MILE POST NO. 17.5
 DISTRICT: MED
 SHEET NO. **SS-17.5-1020A**



1 CHAIN LINK SECURITY FENCE DETAIL
N.T.S.

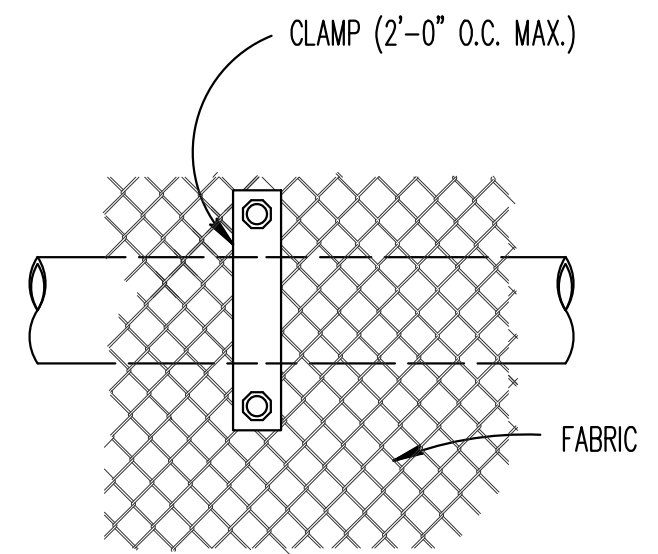


2 LINE POST
N.T.S.

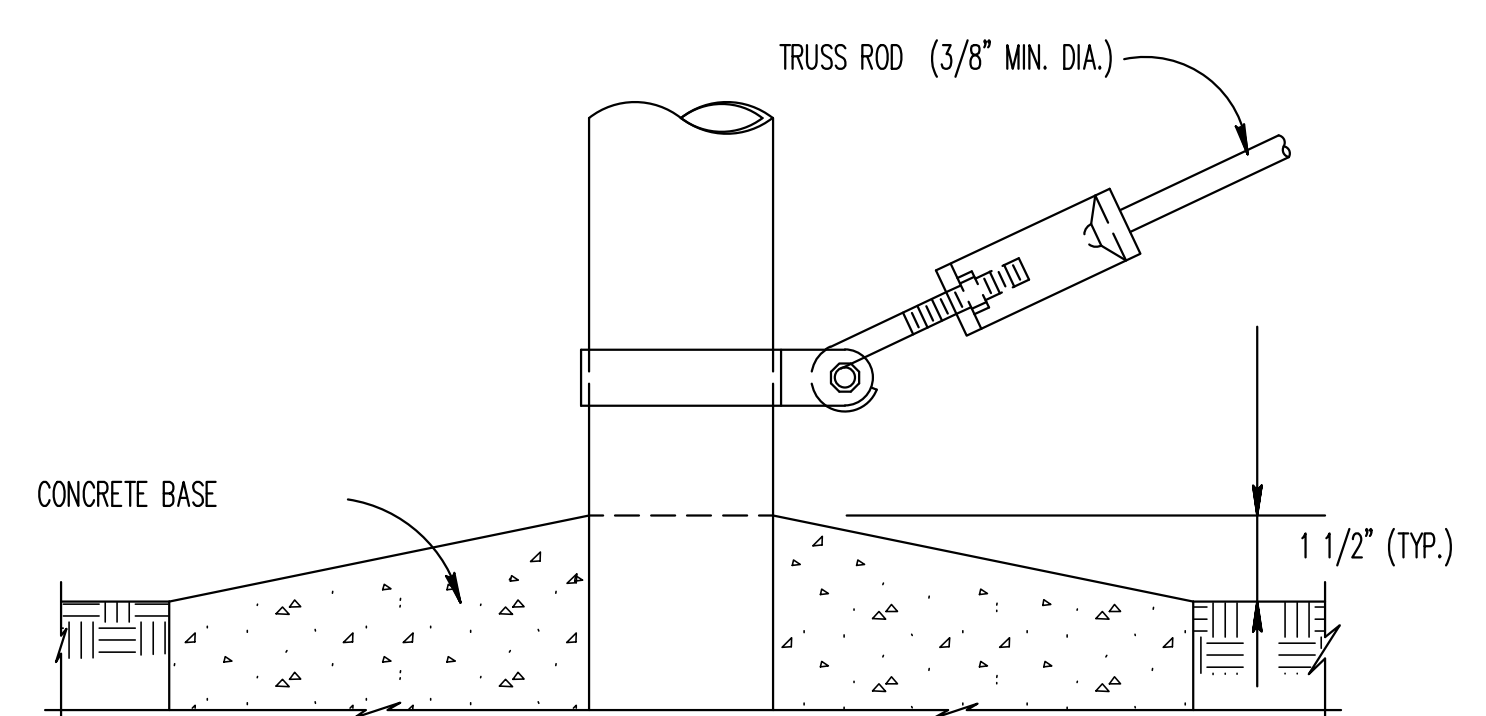


3 CORNER POST
N.T.S.

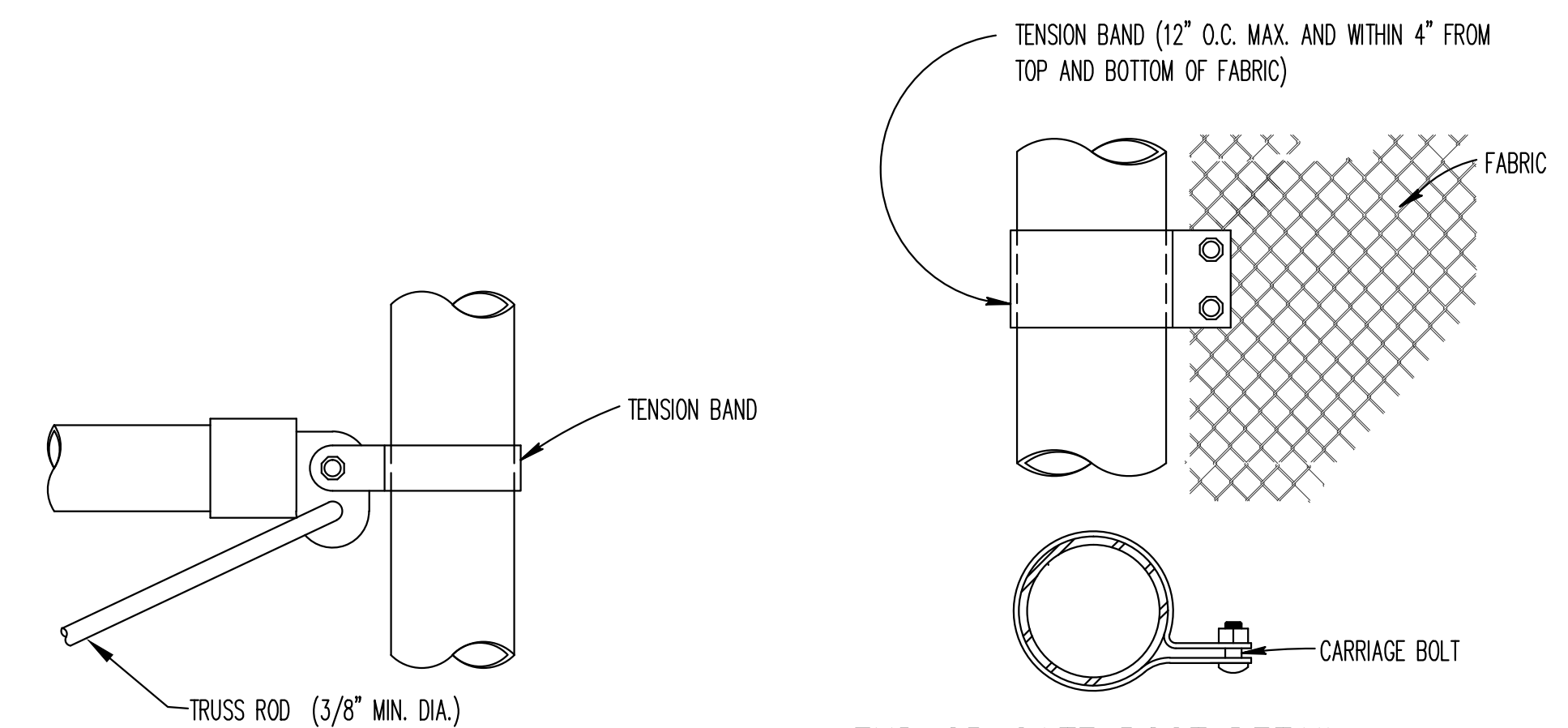
EXTENSION ARM DETAILS
N.T.S.



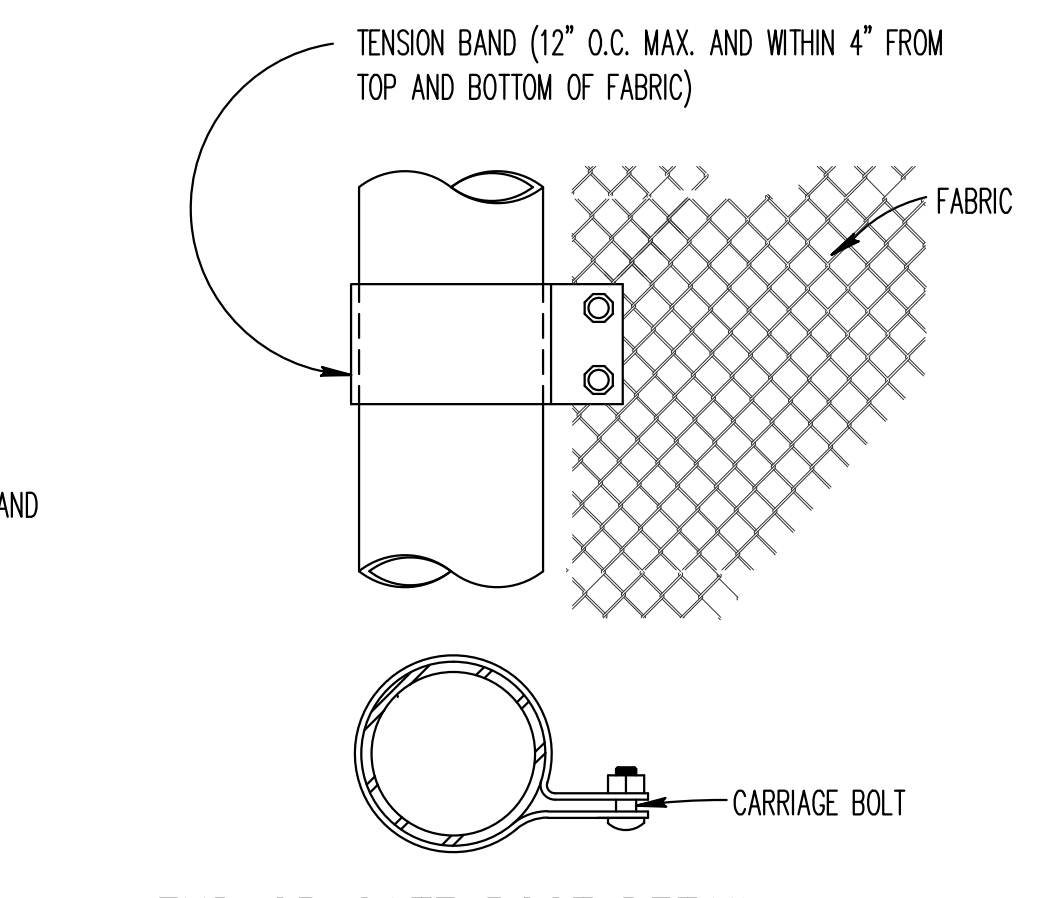
4 TOP OR BRACE RAIL ATTACHMENT
N.T.S.



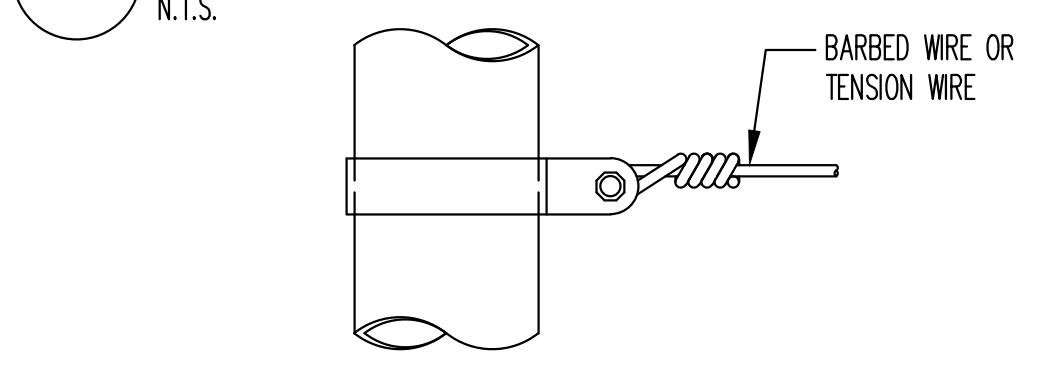
5 TRUSS ROD AND BAND
BRACE RAIL CLAMP DETAILS
N.T.S.



6 ROUND POST
N.T.S.

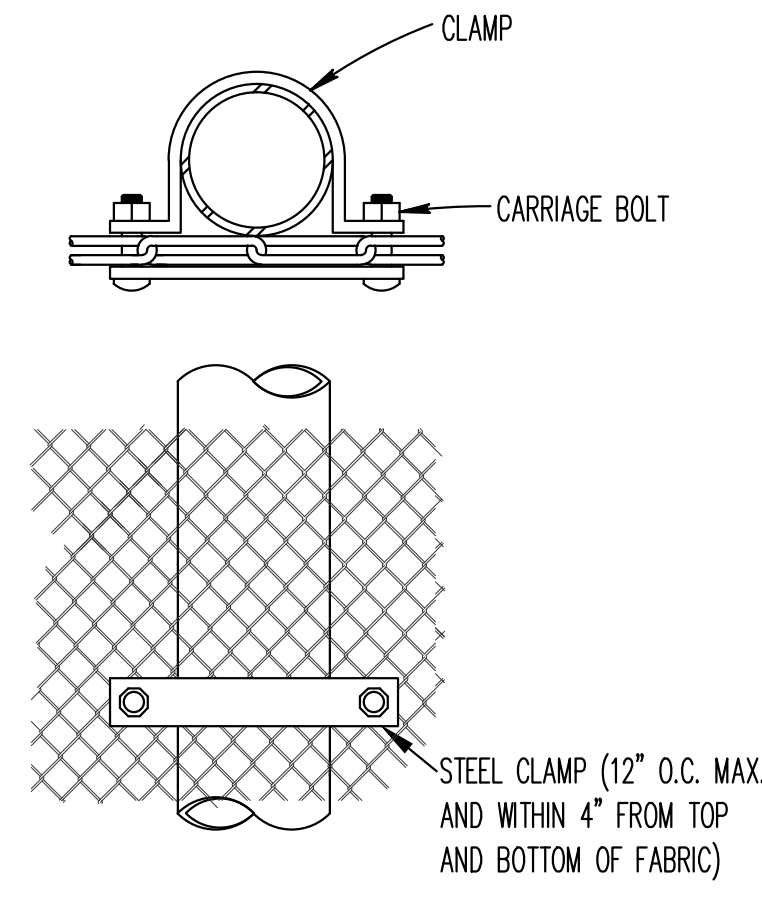


7 END OR GATE POST DETAIL
N.T.S.



8 TENSION BAND DETAIL
N.T.S.

FASTENING DETAILS
N.T.S.



9 LINE POST ATTACHMENTS
N.T.S.

NOTES:

- DETAILS SHOWN ARE TO CLARIFY REQUIREMENTS AND ARE NOT INTENDED TO LIMIT OTHER TYPES OF FENCE SECTIONS AND METHODS OF INSTALLATION THAT COMPLY WITH THE SPECIFICATIONS.
- WIRE TIES, RAILS, POSTS, AND BRACES SHALL BE CONSTRUCTED ON THE SECURE SIDE OF THE FENCE ALIGNMENT. CHAIN LINK FABRIC SHALL BE PLACED ON THE SIDE OPPOSITE THE SECURE AREA.
- UNLESS SPECIFICALLY SHOWN OR SPECIFIED, FENCE SHALL HAVE AN APRON EXTENDED OUTWARD FROM THE AREA BEING PROTECTED.

USE AND SECTION	STEEL POST SCHEDULE		
	MINIMUM OUTSIDE DIMENSIONS (NOMINAL)		
	FABRIC WIDTH 72" OR LESS	FABRIC WIDTH 84" TO 96"	FABRIC WIDTH 108" AND OVER
CORNER, END & PULL POSTS			
TUBULAR - ROUND	2.375" O.D.	2.875" O.D.	4.00" O.D.
TUBULAR - SQUARE	2.00" SQ.	2.50" SQ.	3.00" SQ.
LINE POSTS			
TUBULAR - ROUND	1.90" O.D.	2.375" O.D.	2.875" O.D.
TOP, BOTTOM & BRACE RAILS			
TUBULAR - ROUND		1.66" O.D.	
TUBULAR - SQUARE		1.50" SQ.	

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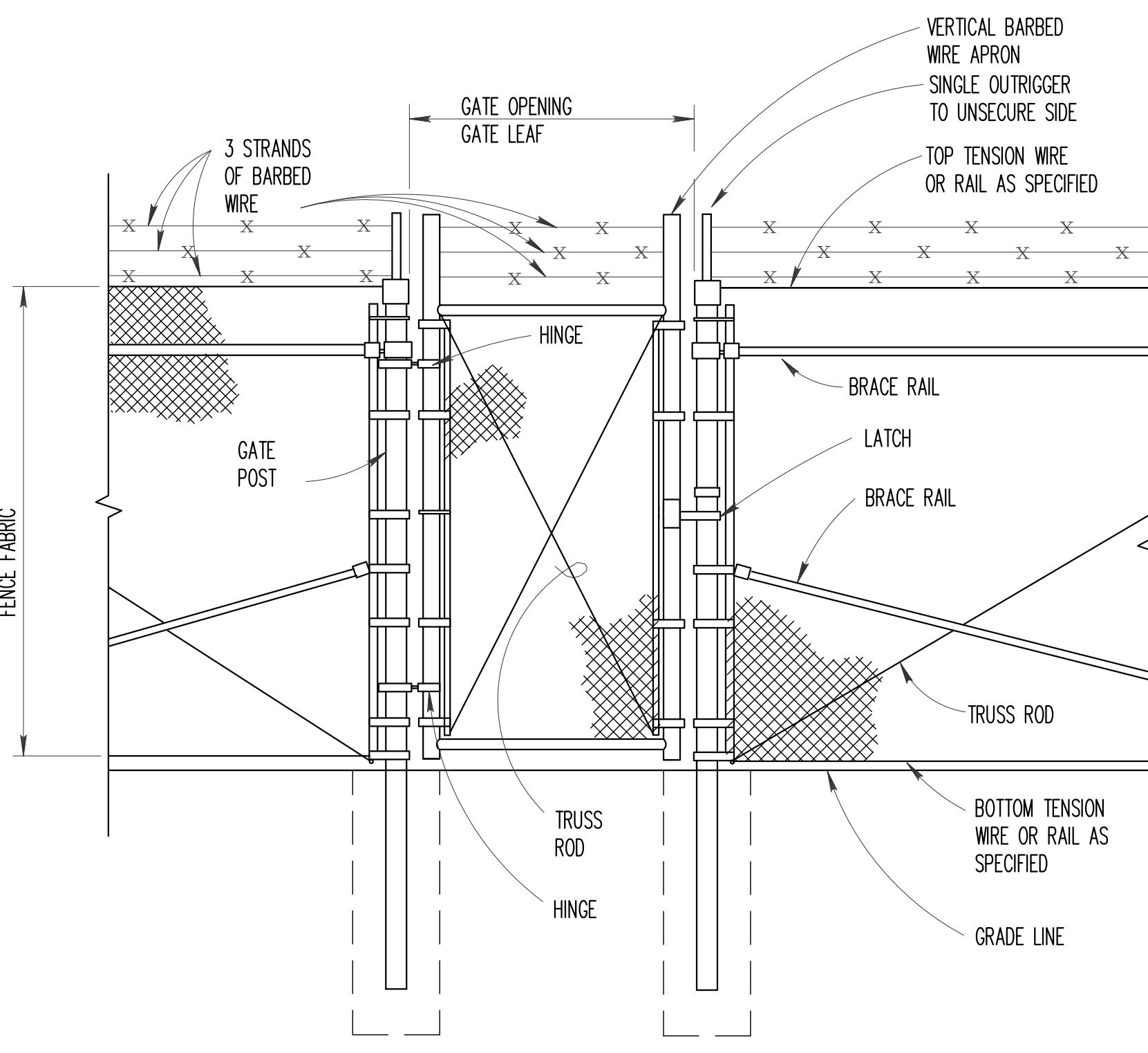
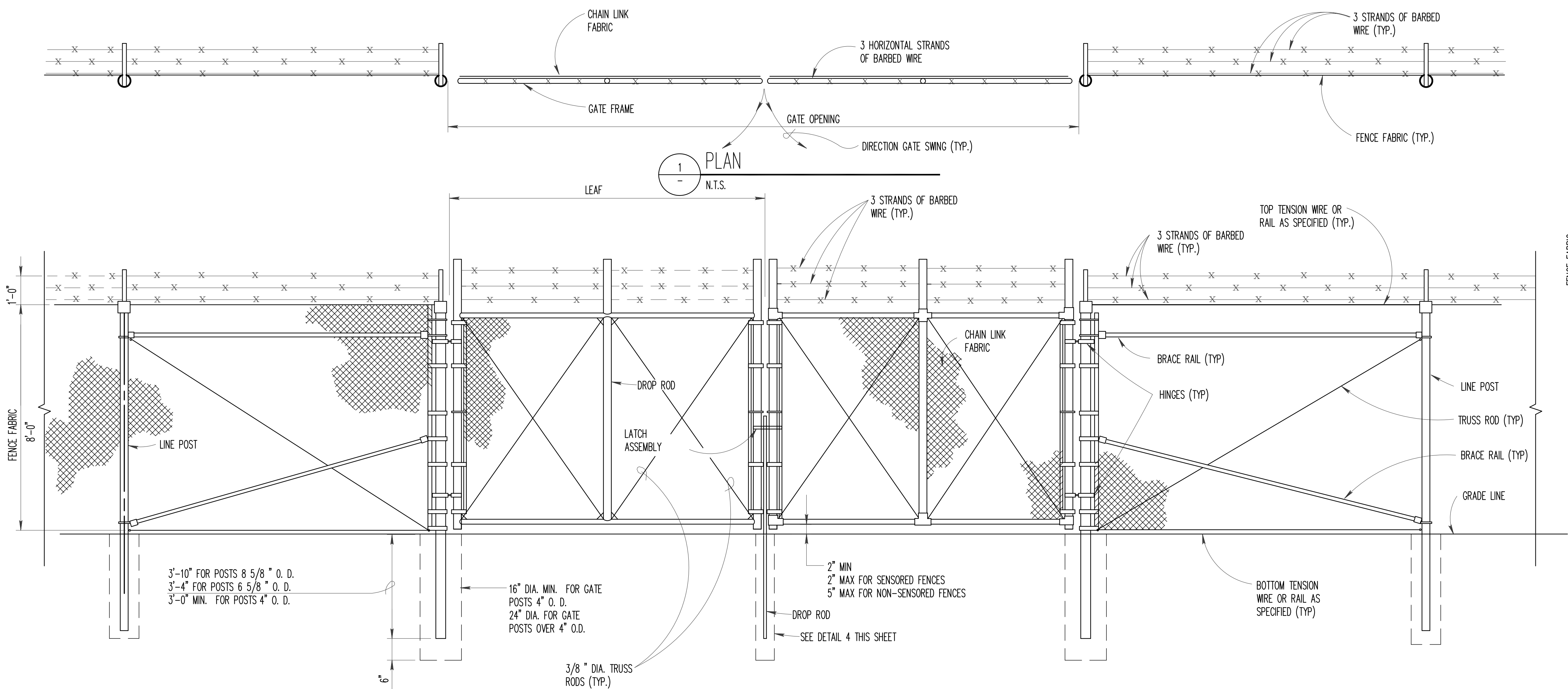
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 METRA P.M.: R. CERANT
 DATE: JUNE 12, 2017

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 CHICAGO, ILLINOIS 60661

LOCATION NAME: **ALL SUBSTATIONS**
 TITLE: **CHAIN LINK FENCE DETAILS**

CAD FILE NUMBER: SS-17.5-1020B.DGN
 SCALE: AS SHOWN
 PROJECT NO. GW4254-57102002
 MILE POST NO. N/A
 DISTRICT: MED
 SHEET NO. **SS-17.5-1020B**

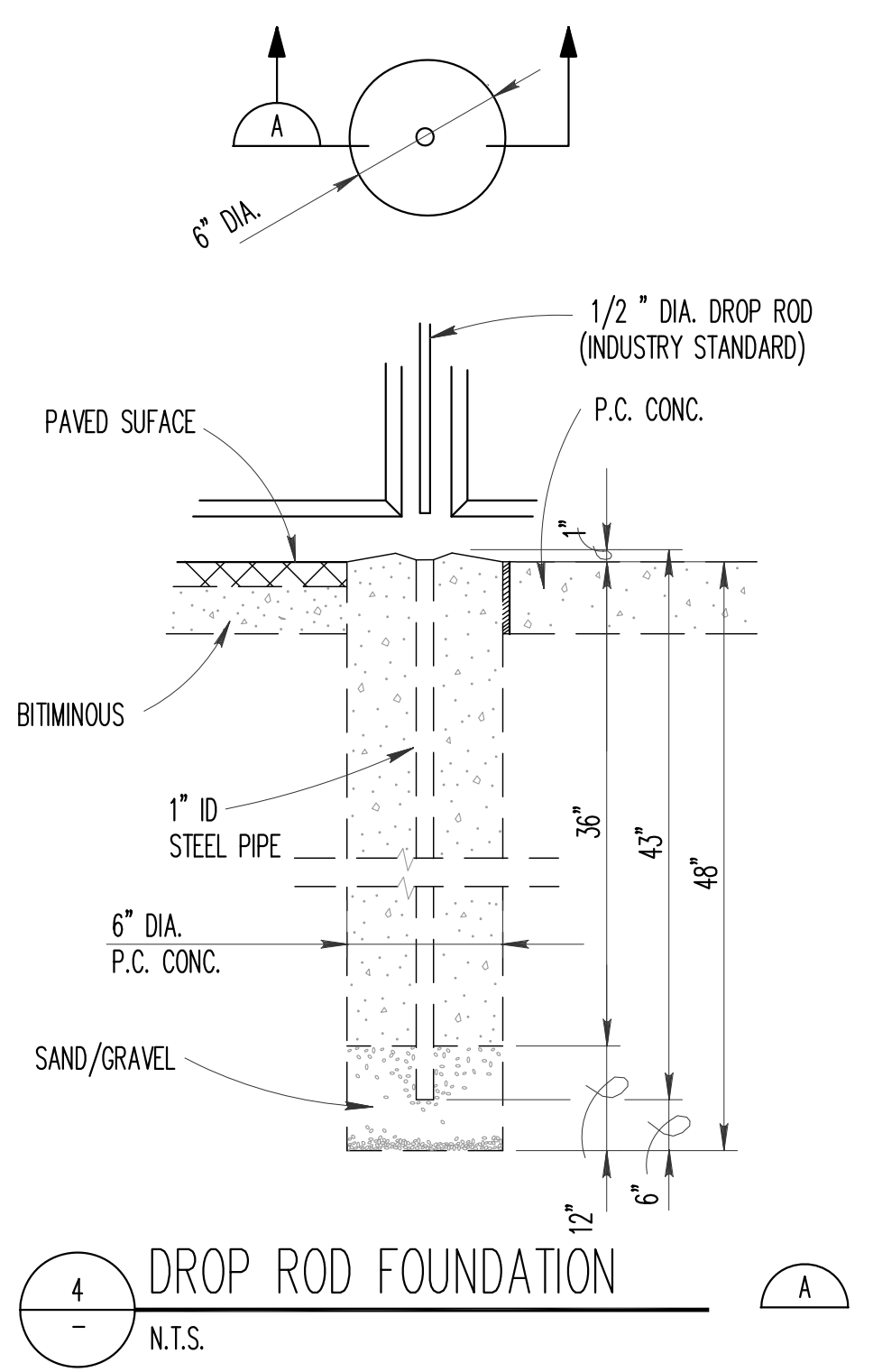


1 PLAN
N.T.S.

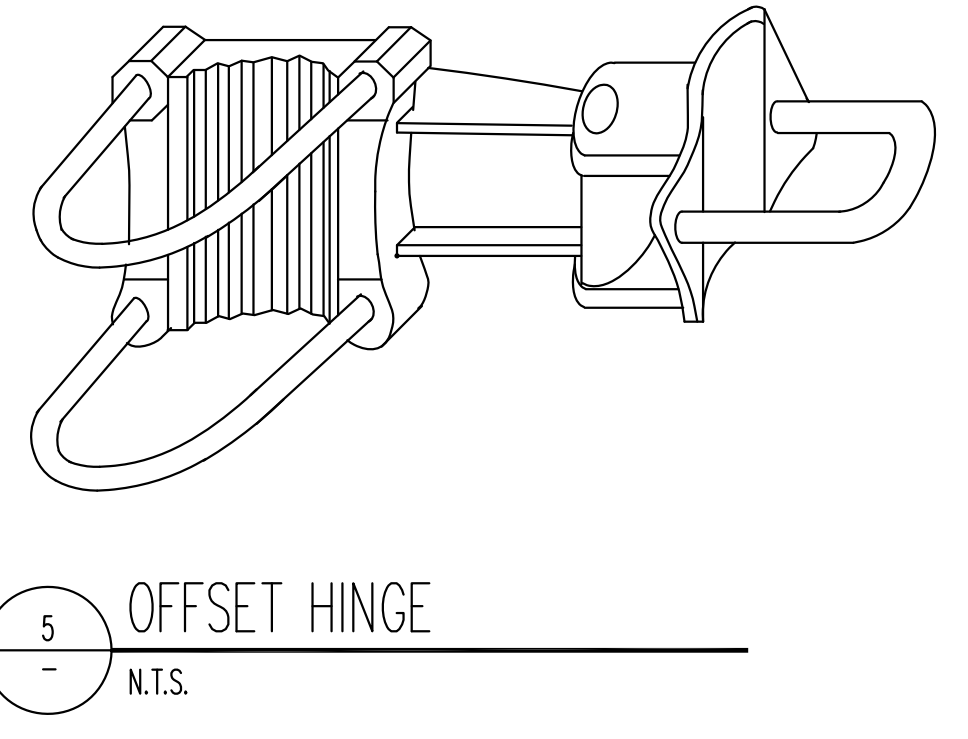
3 ELEVATION DOUBLE SWING GATE
N.T.S.

2 PERSONNEL GATE
N.T.S.

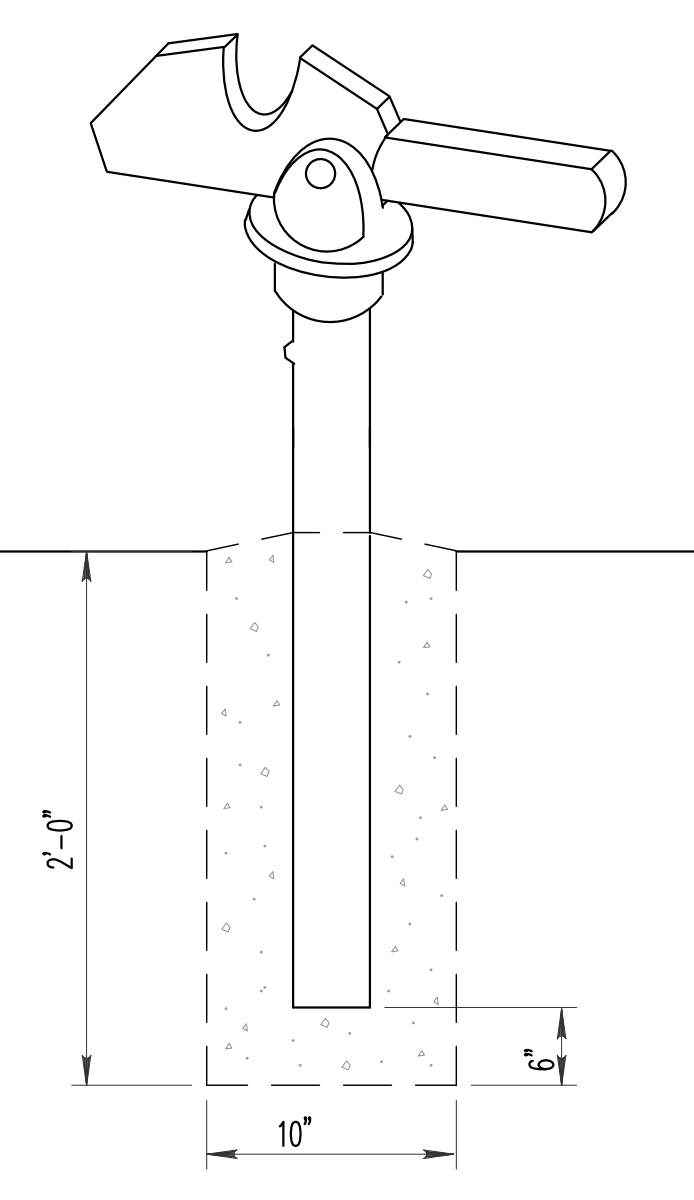
- NOTES:
1. DETAILS SHOWN ARE TO CLARIFY REQUIREMENTS AND ARE NOT INTENDED TO LIMIT OTHER TYPE OF FENCE SECTIONS AND METHODS OF INSTALLATION WHICH COMPLY WITH THE SPECIFICATIONS.
 2. SWING GATES SHALL BE CONSTRUCTED WITH DROP RODS, PADLOCKS, LATCH ASSEMBLY AND GATE KEEPERS EXCEPT AS NOTED.
 3. ALL GATE FRAMES SHALL MEET THE MINIMUM REQUIREMENTS OF ASTM F900 1.90" NOMINAL (ROUND) OR 2.00" NOMINAL (SQUARE); GATE FRAMES SHALL BE OF WELDED CONSTRUCTION OR SHALL BE ASSEMBLED USING HEAVY FITTINGS. AT CONTRACTOR'S OPTION A WELDED HORIZONTAL BRACE MAY BE USED IN LIEU OF TRUSS RODS TO BRACE ALL-WELDED GATE FRAMES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER RIGID CONSTRUCTION OF ALL GATES SUPPLIED.



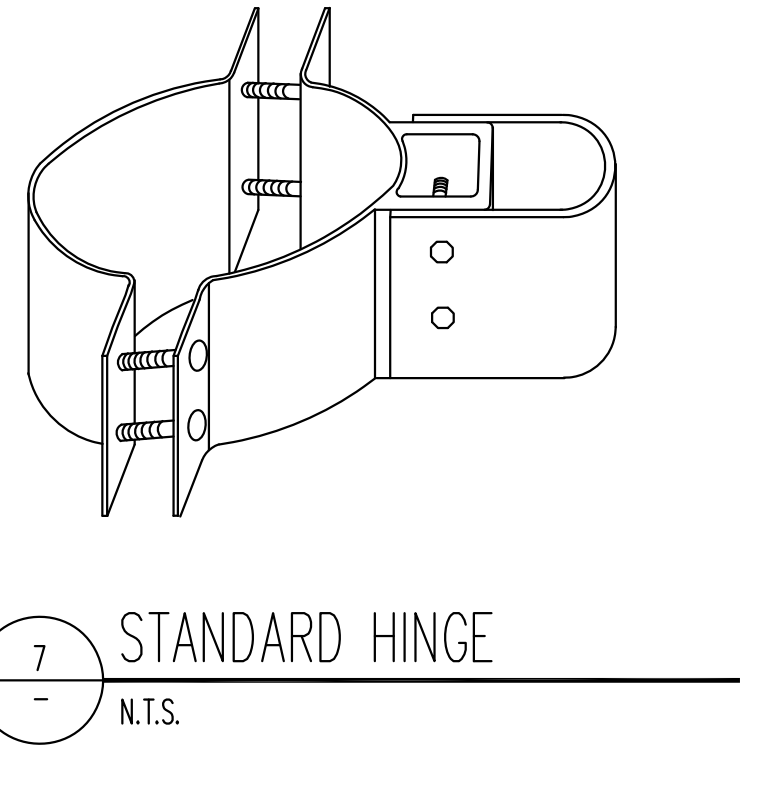
4 DROP ROD FOUNDATION
N.T.S.



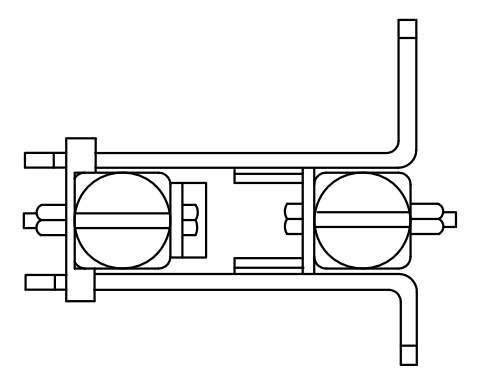
5 OFFSET HINGE
N.T.S.



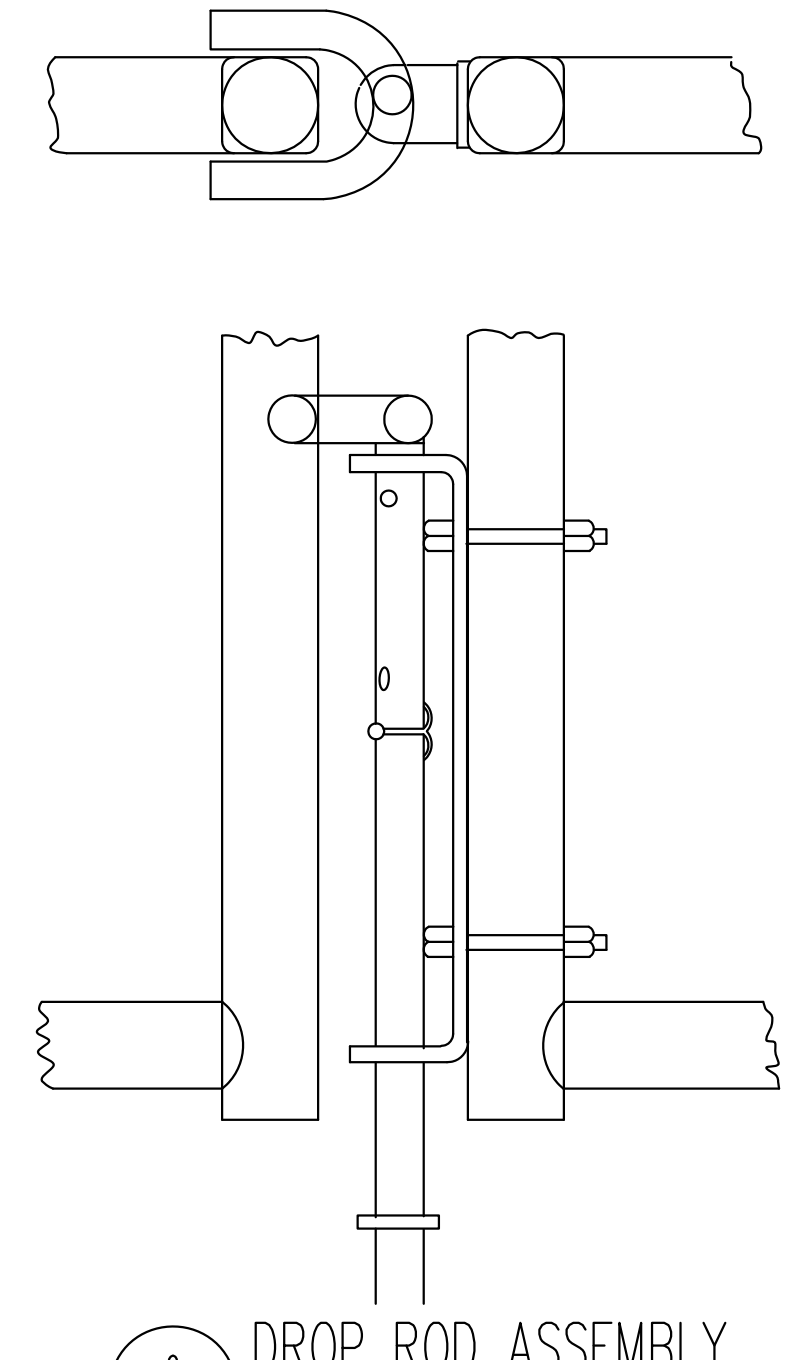
6 GATE KEEPER
N.T.S. (TO HOLD GATE OPEN)



7 STANDARD HINGE
N.T.S.



8 LATCH ASSEMBLY
N.T.S.



9 DROP ROD ASSEMBLY
SCALE: 1/2"=1'-0"

SWING GATE DETAILS
N.T.S.

GATE POST SCHEDULE	
GATE LEAF WIDTH (NOMINAL)	OUTSIDE DIMENSION (NOMINAL)
12' OR LESS	4.0" OD
GREATER THAN 12' TO 18'	6.625" OD
MORE THAN 18'	8.625" OD

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DATE: JUNE 12, 2017

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CHICAGO, ILLINOIS 60661

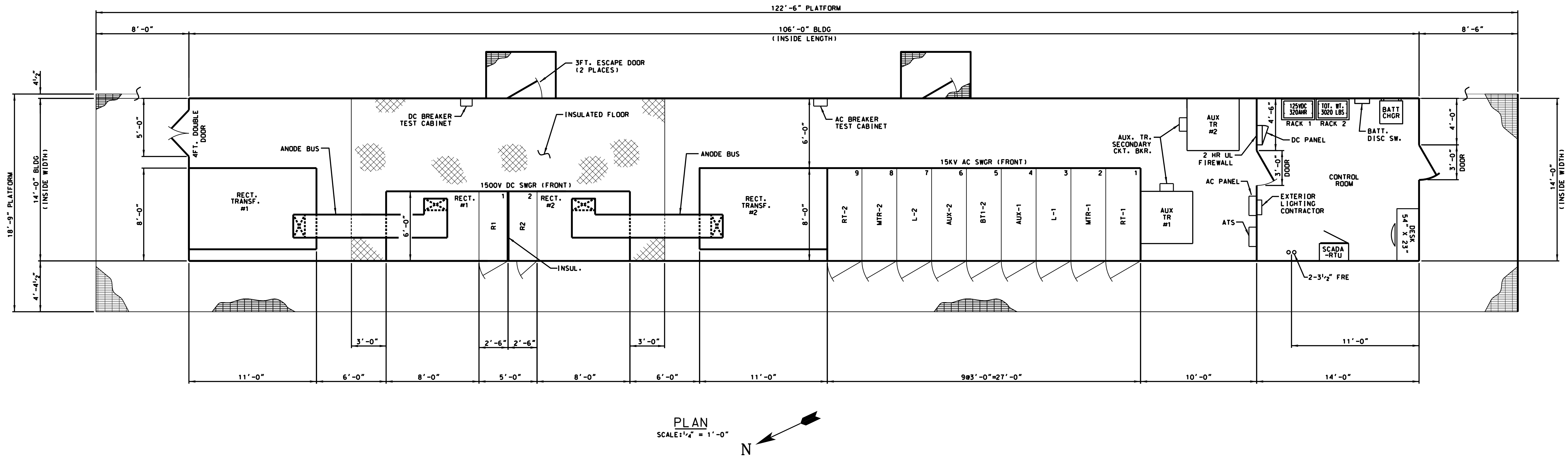
LOCATION NAME: **ALL SUBSTATIONS**

TITLE: **CHAIN LINK SWING GATE DETAILS**

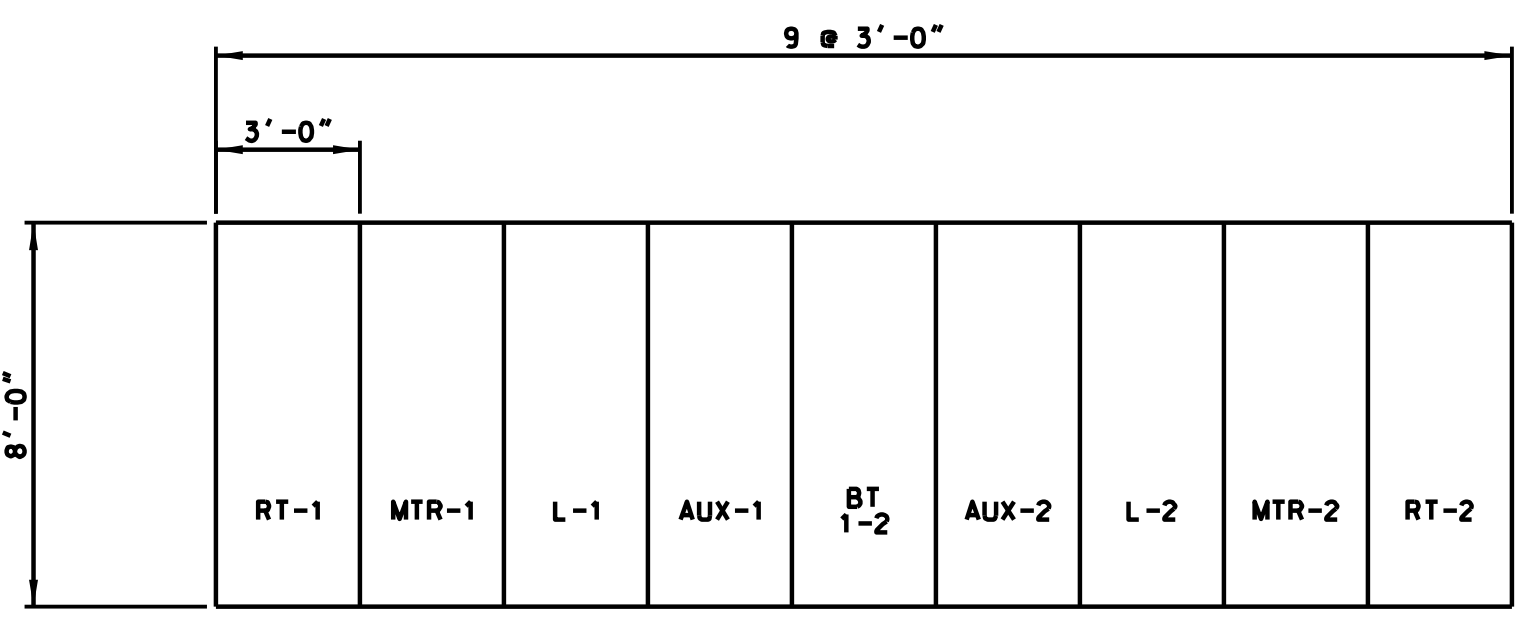
CAD FILE NUMBER: SS-17.5-1020C.DGN

SCALE: AS SHOWN
PROJECT NO. GW4254-57102002
MILE POST NO. N/A

DISTRICT: MED
SHEET NO. **SS-17.5-1020C**



PLAN
SCALE: 1/4" = 1'-0"



AC SWITCHGEAR ELEVATION
SCALE: 1/4" = 1'-0"

- NOTES:**
- 1. SUBSTATION BUILDING ENCLOSURE SHALL BE MAXIMUM 14 FEET HIGH.
 - 2. FOR UNDERGROUND DUCTBANKS AND CONDUITS SEE DWG. SS-17.5-1071.
 - 3. THE REAR OF TRANSFORMER AND RECTIFIER SHALL BE PROVIDED WITH REMOVABLE PANELS.

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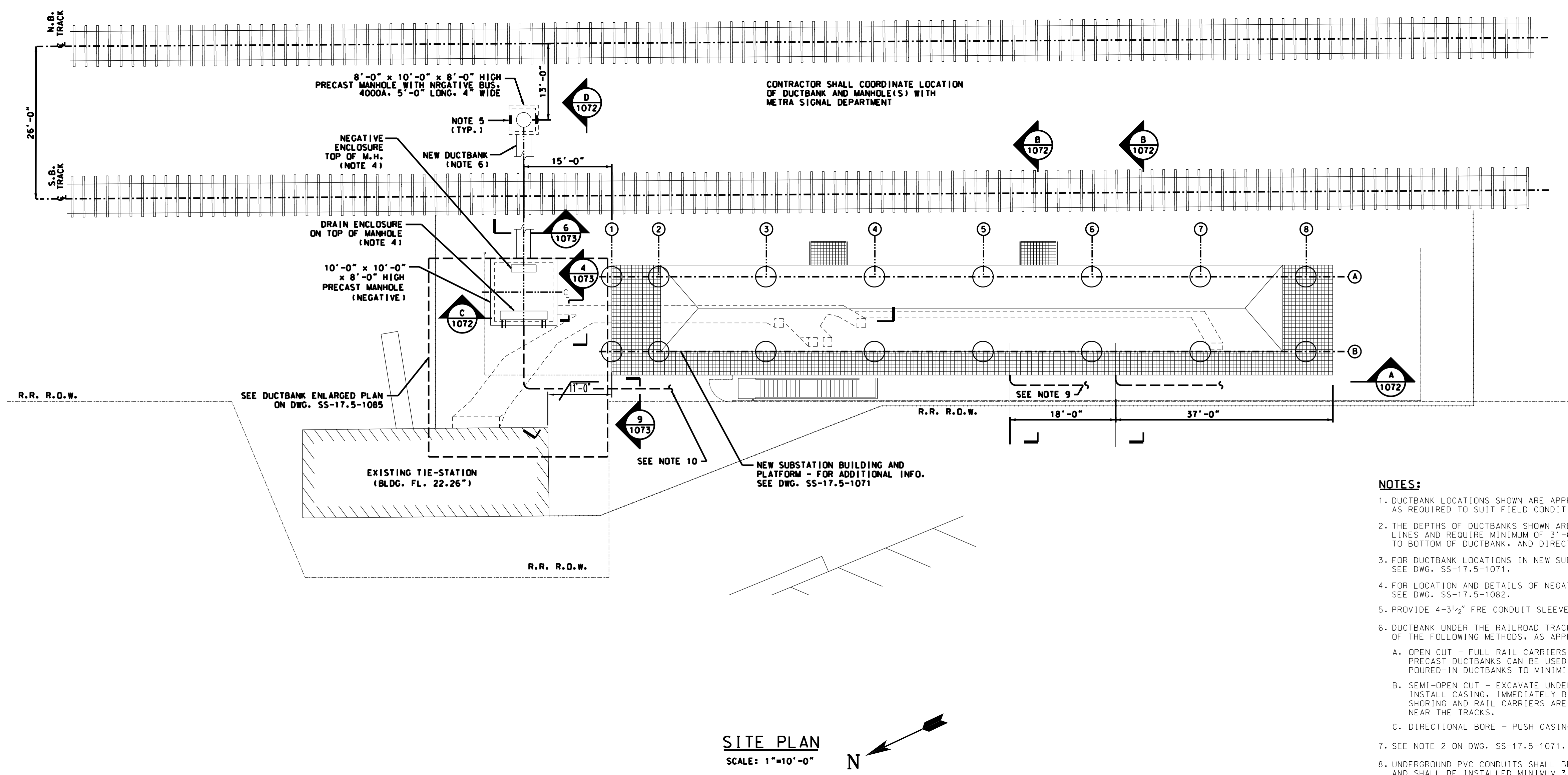
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DRAWN: JMC
CHECKED: FM
METRA P.M.: R. CERANT
DATE: JUNE 12, 2017

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CHICAGO, ILLINOIS 60661

LOCATION NAME: RIVERDALE SUBSTATION
TITLE: SUBSTATION EQUIPMENT LAYOUT PLAN

CAD FILE NUMBER: SS-17.5-1050.DGN	
SCALE: NTS	DISTRICT: MED
PROJECT NO. GW4254-57102002	SHEET NO. SS-17.5-1050
MILE POST NO. 17.5	



SITE PLAN
SCALE: 1"=10'-0"

- NOTES:**
- DUCTBANK LOCATIONS SHOWN ARE APPROXIMATE AND SHALL BE ADJUSTED AS REQUIRED TO SUIT FIELD CONDITIONS.
 - THE DEPTHS OF DUCTBANKS SHOWN ARE BASED ON EXISTING CONTOUR LINES AND REQUIRE MINIMUM OF 3'-6" COVERAGE FROM GRADE TO BOTTOM OF DUCTBANK, AND DIRECT BURIED PVC CONDUITS.
 - FOR DUCTBANK LOCATIONS IN NEW SUBSTATION BUILDING AREA SEE DWG. SS-17.5-1071.
 - FOR LOCATION AND DETAILS OF NEGATIVE AND DRAIN ENCLOSURES SEE DWG. SS-17.5-1082.
 - PROVIDE 4-3/2" FPE CONDUIT SLEEVES IN MANHOLE WALL.
 - DUCTBANK UNDER THE RAILROAD TRACK SHALL BE INSTALLED BY ONE OF THE FOLLOWING METHODS, AS APPROVED BY METRA:
 - A. OPEN CUT - FULL RAIL CARRIERS ARE REQUIRED, PRECAST DUCTBANKS CAN BE USED INSTEAD OF POURED-IN DUCTBANKS TO MINIMIZE CONSTRUCTION TIME.
 - B. SEMI-OPEN CUT - EXCAVATE UNDER TRACK AND INSTALL CASING, IMMEDIATELY BACKFILL AND COVER. SHORING AND RAIL CARRIERS ARE ONLY REQUIRED NEAR THE TRACKS.
 - C. DIRECTIONAL BORE - PUSH CASING.
 - SEE NOTE 2 ON DWG. SS-17.5-1071.
 - UNDERGROUND PVC CONDUITS SHALL BE HEAVY WALL TYPE DB-120 AND SHALL BE INSTALLED MINIMUM 3'-6" BELOW GRADE.
 - 3-1/C-750 KCMIL CABLES IN 6" PVC UNDERGROUND CONDUIT AND ONE 6" PVC SPARE CONDUIT FROM AC SWGR TO COMED SPLICE BOXES FOR AC INCOMING SERVICE.
 - CONTRACTOR SHALL INSTALL 4-4" PVC UNDERGROUND CONDUITS AT NEGATIVE MANHOLE, 2 EACH FOR COMED SPLICE BOX FOR LINE G-766 AND LINE G-762. 1-1/C - 1500 KCMIL DRAIN CABLE SHALL BE INSTALLED IN ONE OF THE TWO CONDUITS CONNECTED TO THE SPLICE BOX, THE OTHER CONDUIT SHALL BE SPARE. ALL UNDERGROUND CONDUITS SHALL BE INSTALLED 3'-6" BELOW GRADE.
 - ALL UNDERGROUND CONDUITS SHALL BE INSTALLED ONE FOOT EAST OF THE R.R. R.O.W.
 - CABLES FROM THE NEGATIVE BUS TO THE TRACKS SHALL BE PROVIDED AND INSTALLED BY METRA.
 - THE CONTRACTOR SHALL INCLUDE IN BID 100 LF OF UNDERGROUND CONDUITS AND CABLES FOR AC INCOMING LINES (2) (FROM THE SUBSTATION BUILDING), AND FOR DRAIN LINES (2) (FROM THE NEGATIVE MANHOLE) TO THE COMED SPLICE BOXES.

REV	DATE	BY	APP	DESCRIPTION	REV	DATE	BY	APP	DESCRIPTION
2	06-08-2018	JMC	HS	ISSUED FOR BID					
1	03-30-2018	JMC	HS	ISSUED FOR ADDENDUM 1					
0	07-28-2017	HS	HS	ISSUED FOR BID					

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IDP | **A Company of Gannett Fleming**

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DESIGNED: HS

DRAWN: JMC

CHECKED: FM

METRA P.M.: R. CERANT

DATE: JUNE 12, 2017

Metra

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CHICAGO, ILLINOIS 60661

LOCATION NAME:
RIVERDALE SUBSTATION

TITLE:
ELECTRICAL SITE PLAN

CAD FILE NUMBER: SS-17.5-1070.DGN

SCALE: 1"=10'-0"

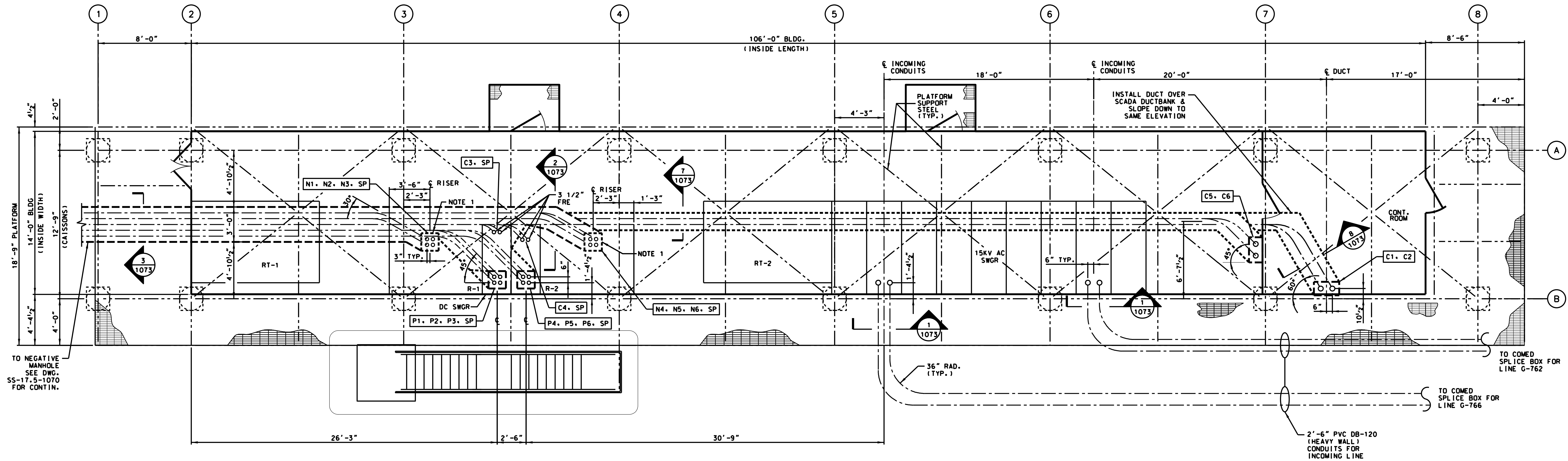
DISTRICT: MED

PROJECT NO. GW4254-57102002

SHEET NO. **SS-17.5-1070**

MILE POST NO. 17.5

PRINTED ON: \$DATES



PLAN
SCALE: 1/4" = 1'-0" N

- NOTES:**
1. LOCATE (4) 3 1/2" FRE CONDUITS IN AREA DESIGNATED FOR OUTGOING NEGATIVE FEEDERS - SEE RECTIFIER MFR'S DRAWINGS.
 2. THE CONTRACTOR SHALL INCLUDE IN THE BID 150 LF OF UNDERGROUND PVC CONDUIT AND CONDUCTOR TO EXTEND THE INCOMING LINES TO COMED SERVICE SPLICE BOXES.
 3. THE CONTRACTOR SHALL SUBMIT FOR APPROVAL THE DUCTBANK LAYOUT AFTER THE EQUIPMENT MANUFACTURER'S DWGS ARE APPROVED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR EXACT LOCATION OF CONDUIT RISER AT EACH PIECE OF EQUIPMENT.
 4. FOR UNDERGROUND CABLE TABULATION SEE DWG. SS-17.5-1073

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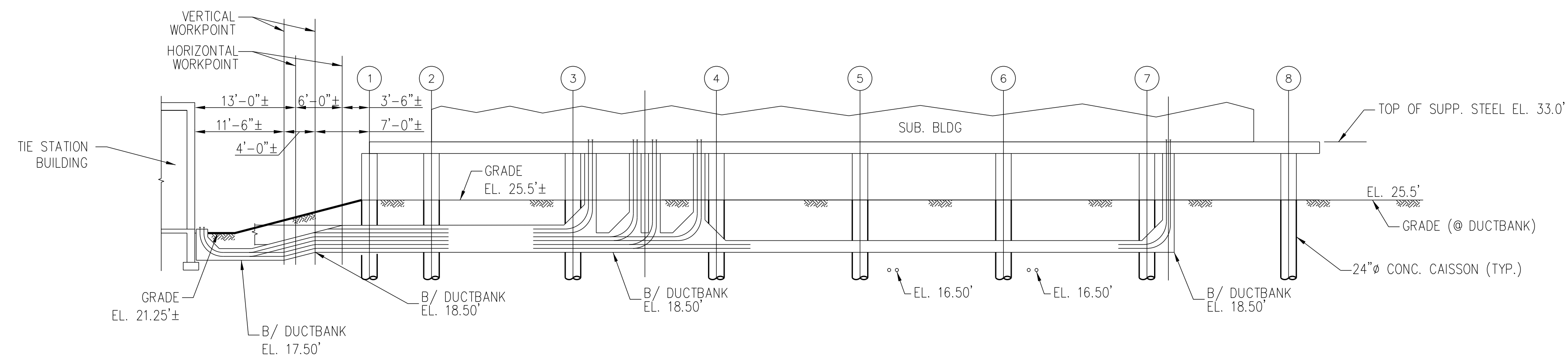
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METRA P.M.: R. CERANT
DATE: JUNE 12, 2017

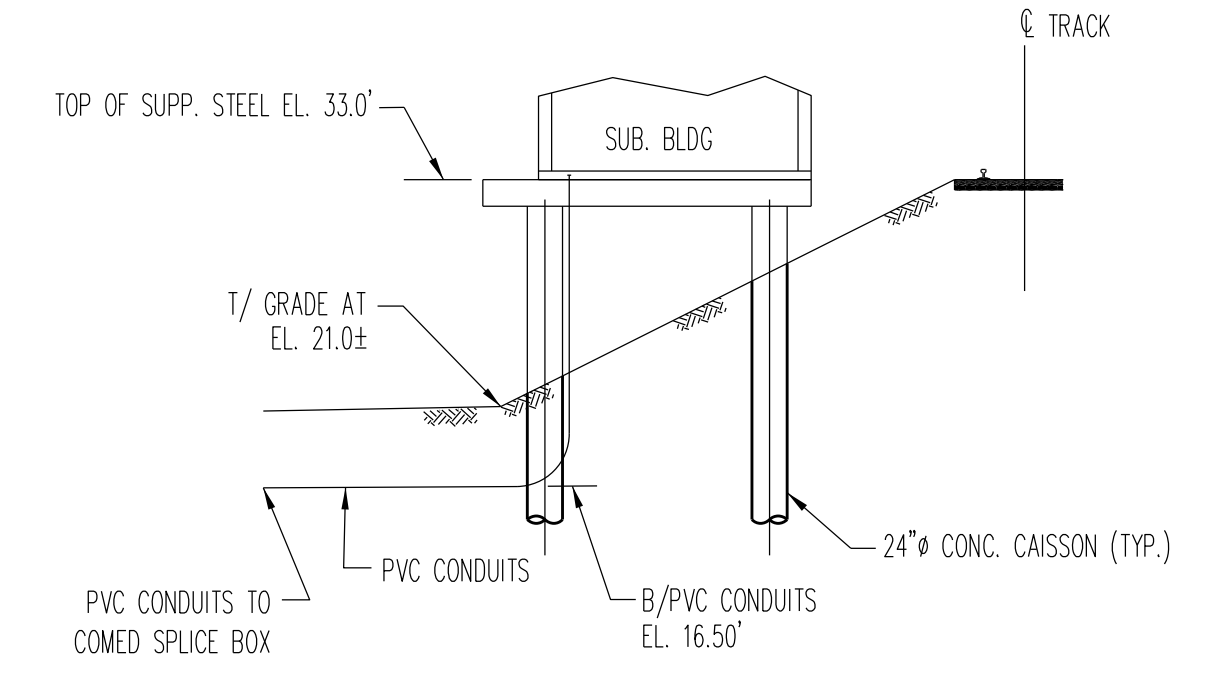
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ENGINEERING DEPARTMENT
547 W. JACKSON BOULEVARD
CHICAGO, ILLINOIS 60661

LOCATION NAME: RIVERDALE SUBSTATION	CAD FILE NUMBER: SS-17.5-1071.DGN
TITLE: UNDERGROUND CONDUIT AND DUCTBANK LAYOUT	SCALE: 1/4" = 1'-0" DISTRICT: MED
	PROJECT NO. GW4254-57102002 SHEET NO. SS-17.5-1071
	MILE POST NO. 17.5

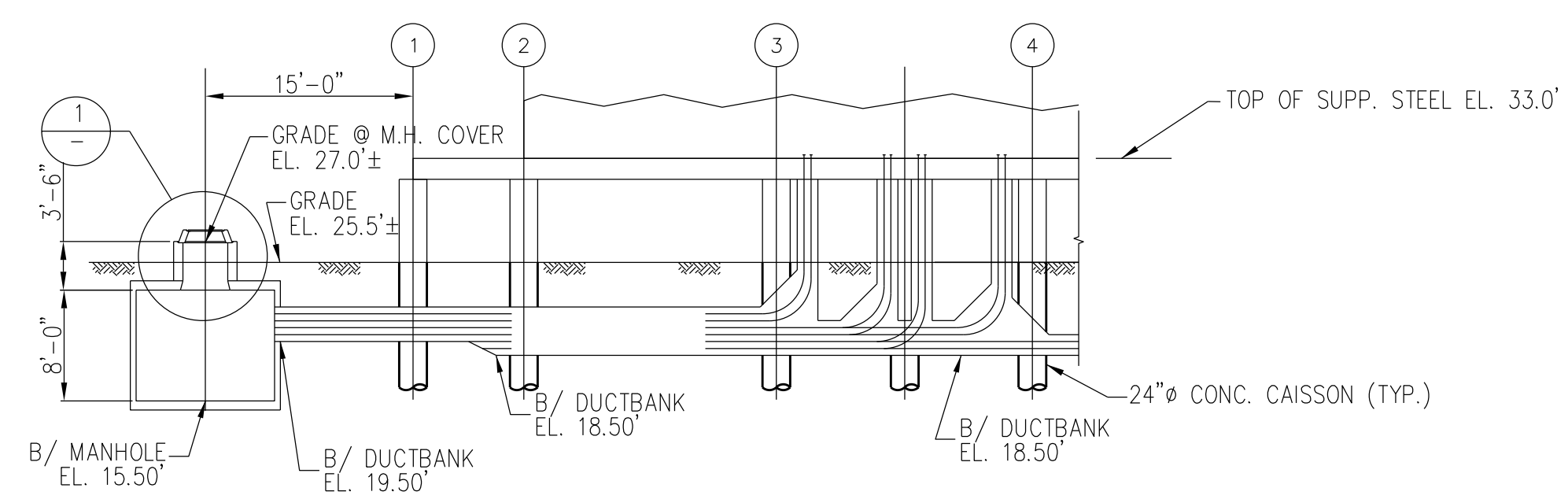
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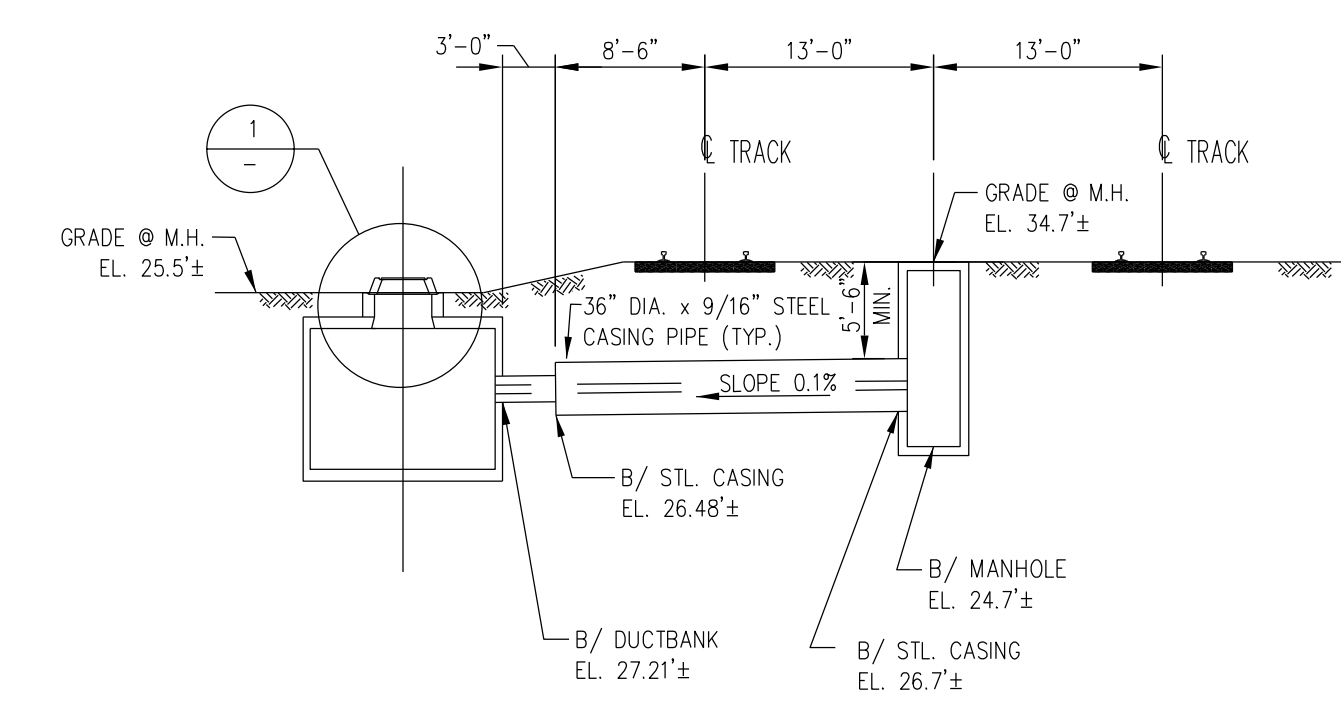
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1070
DUCTBANK PROFILE
SCALE: 1"=10'-0"



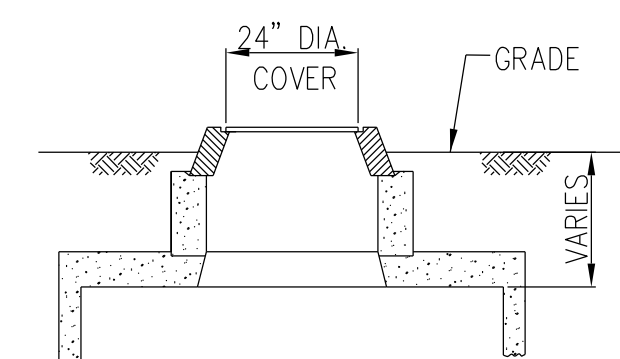
B
1070
INCOMING COMED SERVICE
SCALE: 1"=10'-0"



C
1070
DUCTBANK PROFILE
SCALE: 1"=10'-0"



D
1070
DUCTBANK PROFILE
SCALE: 1"=10'-0"



1
SCALE: N.T.S.

- NOTES:**
1. DUCTBANK LOCATIONS SHOWN ARE APPROXIMATE AND SHALL BE ADJUSTED AS REQUIRED TO SUIT FIELD CONDITIONS.
 2. THE DEPTHS OF DUCTBANKS SHOWN ARE BASED ON EXISTING CONTOUR LINES AND REQUIRE MINIMUM OF 3'-6" COVERAGE FROM GRADE TO BOTTOM OF DUCTBANK.
 3. FOR DUCTBANK AND CONDUIT LOCATIONS IN NEW SUBSTATION BUILDING AREA SEE DWG. SS-17.5-1071.

REV	DATE	BY	APP	DESCRIPTION	REV	DATE	BY	APP	DESCRIPTION
2	06-08-2018	JMC	HS	ISSUED FOR BID					
1	03-30-2018	HS	HS	ISSUED FOR ADDENDUM 1					
0	07-28-2017	HS	HS	ISSUED FOR BID					

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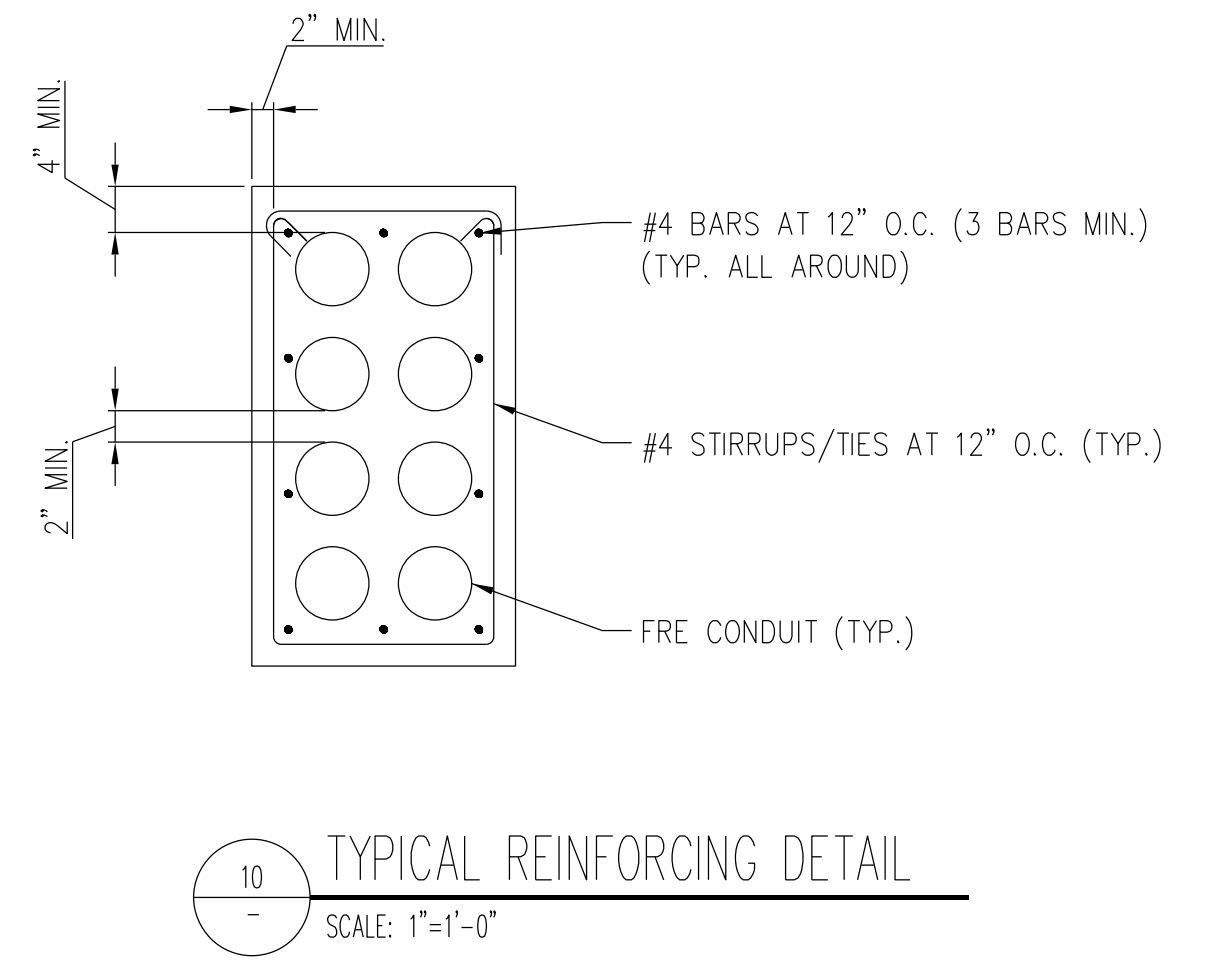
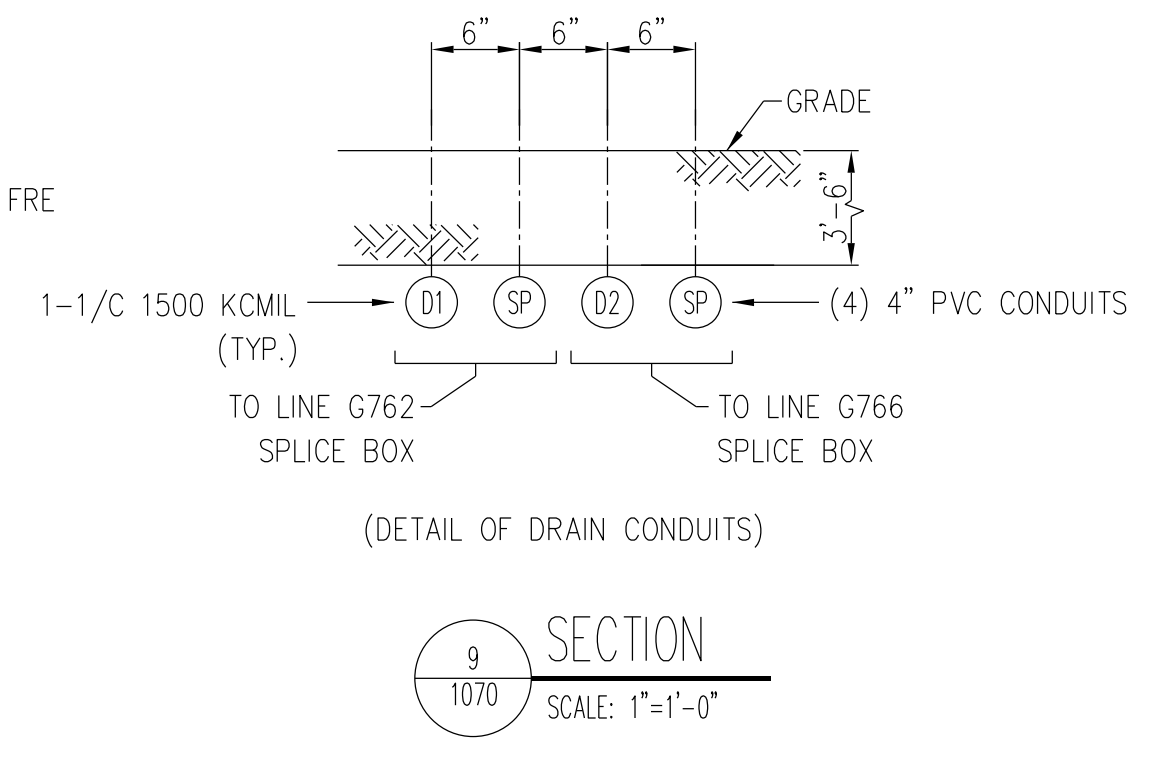
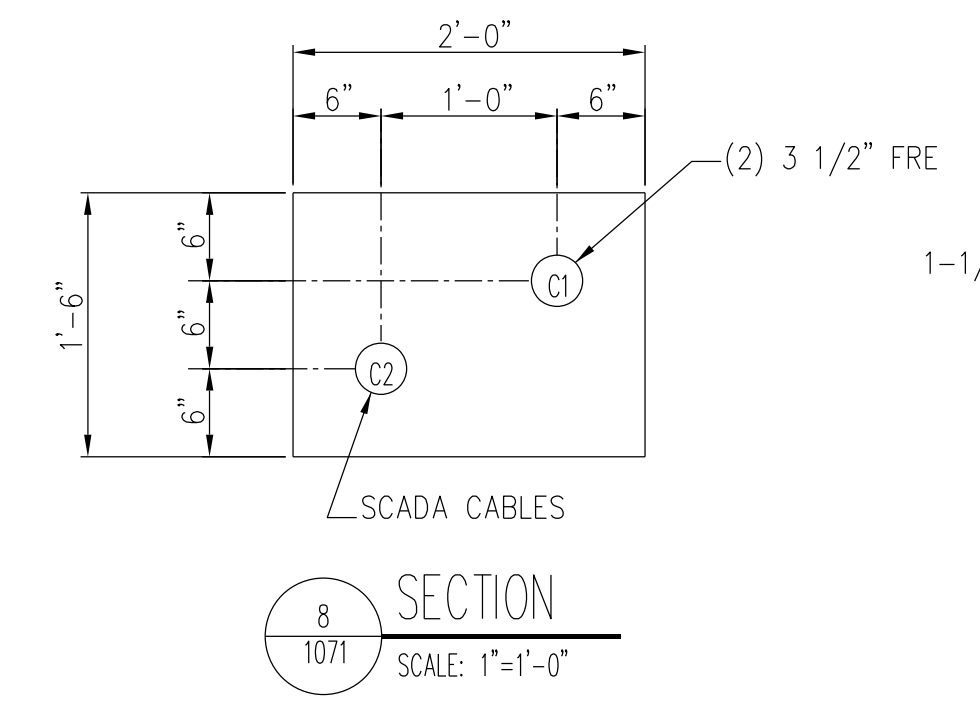
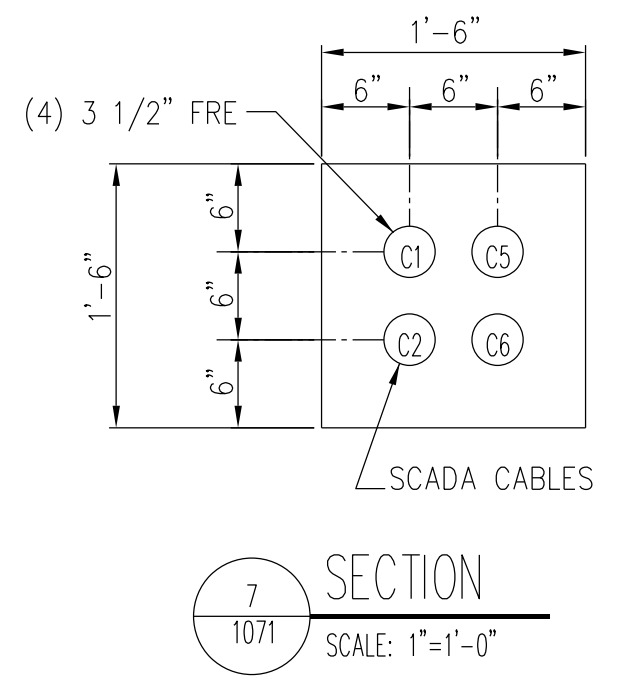
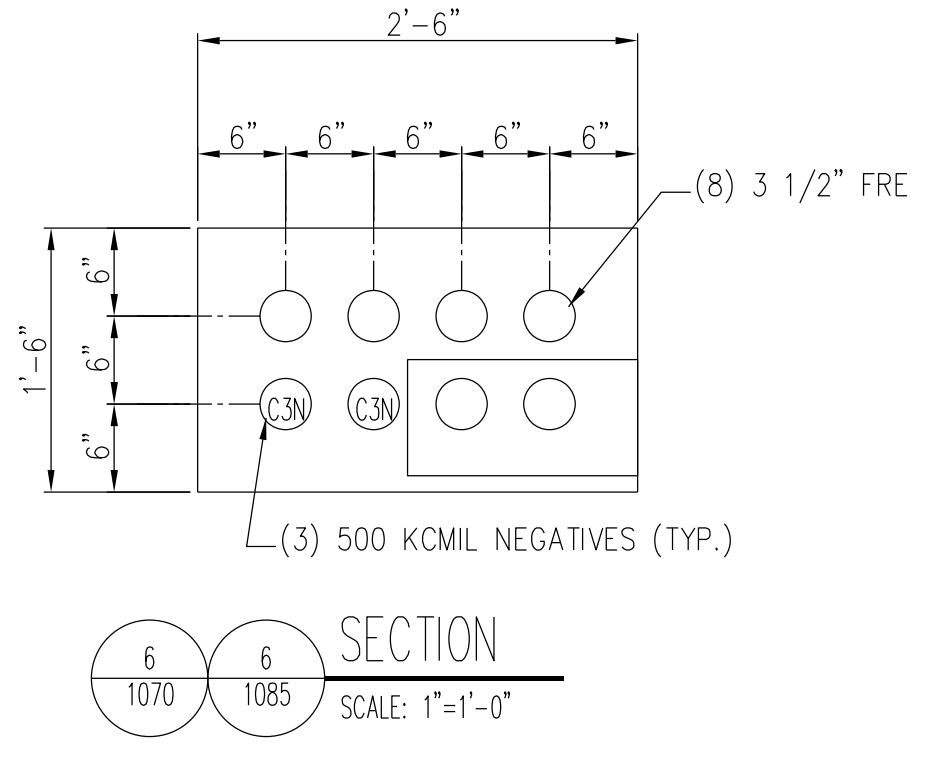
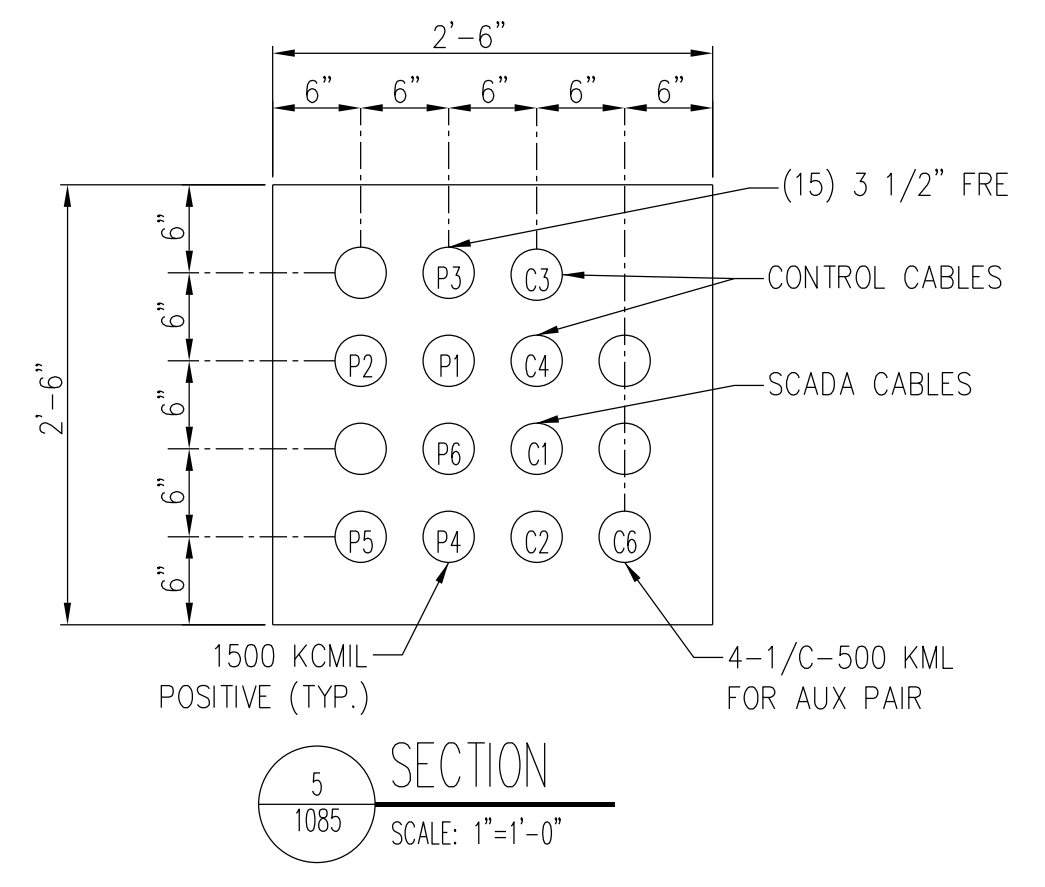
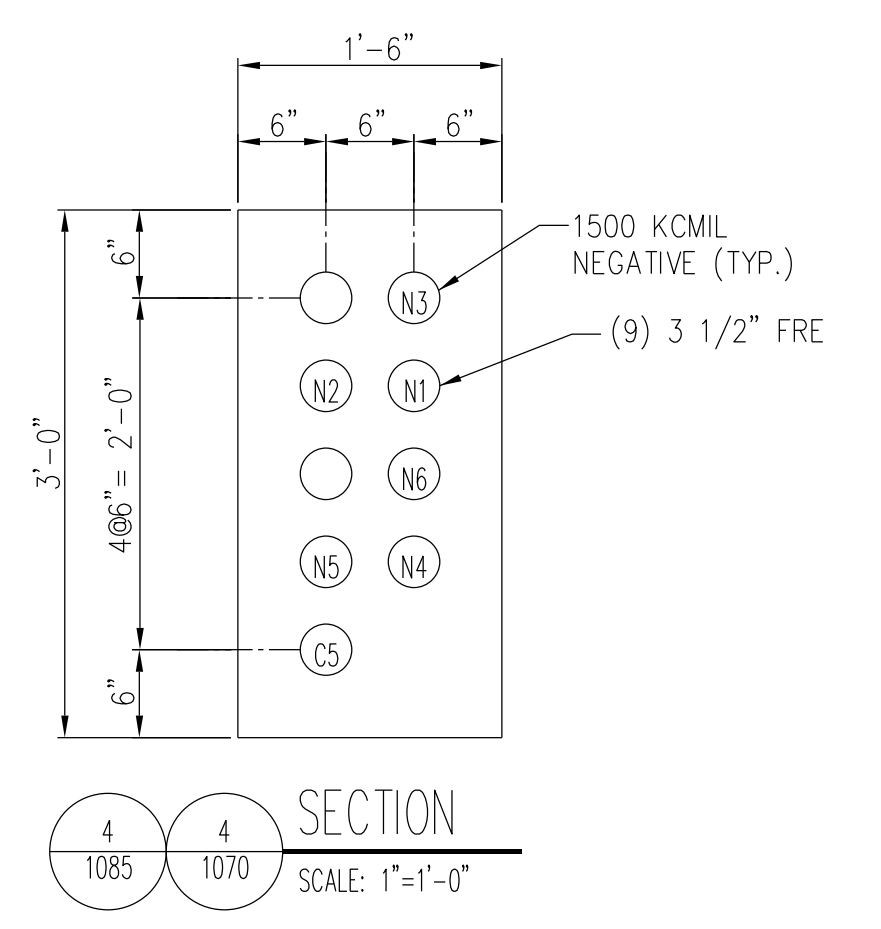
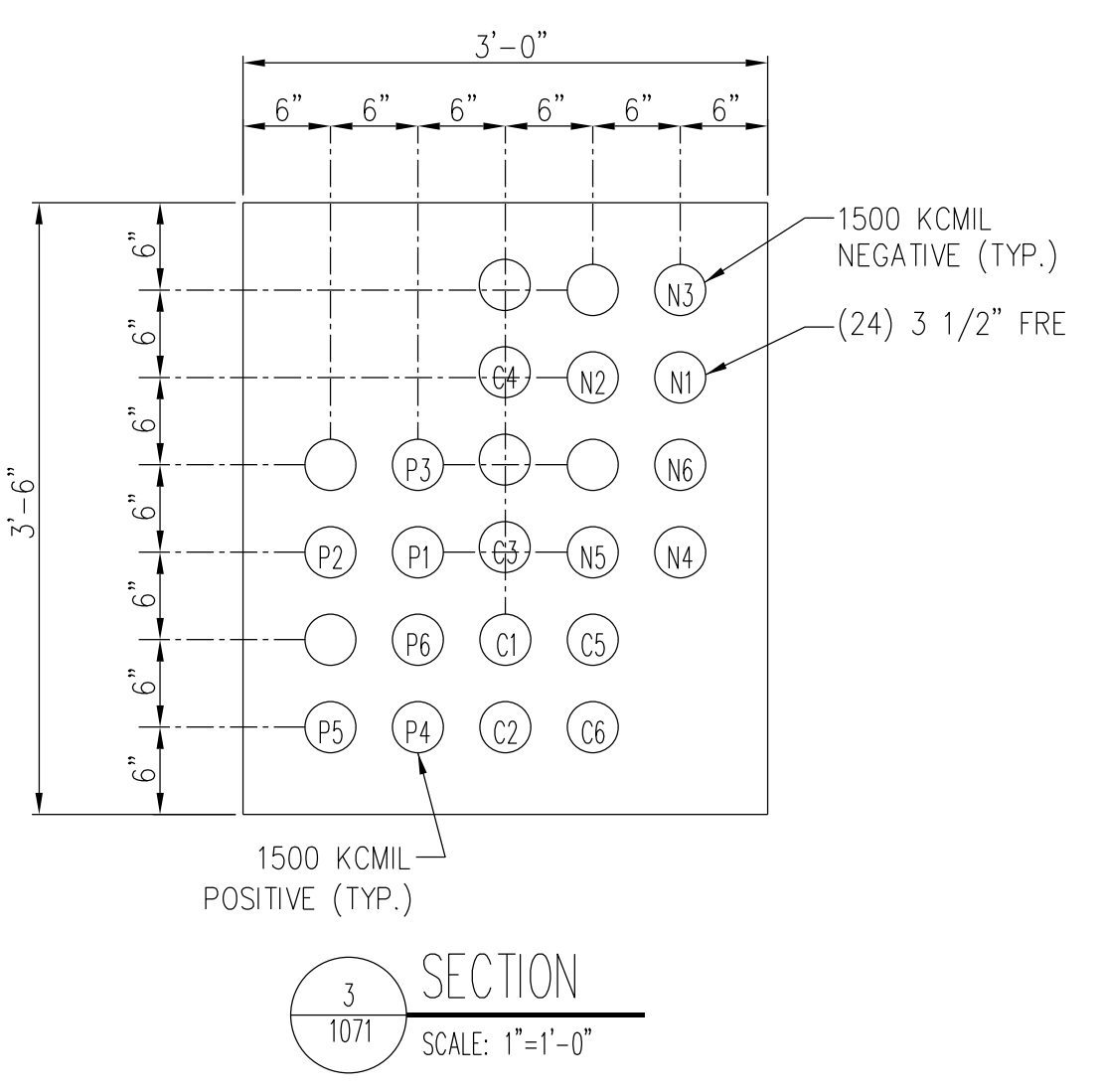
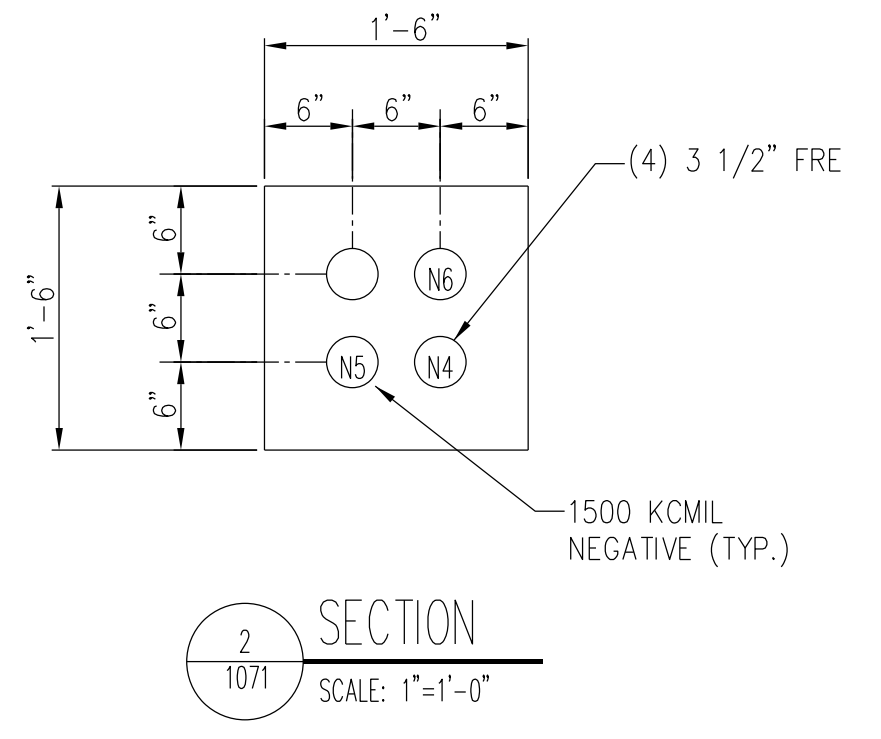
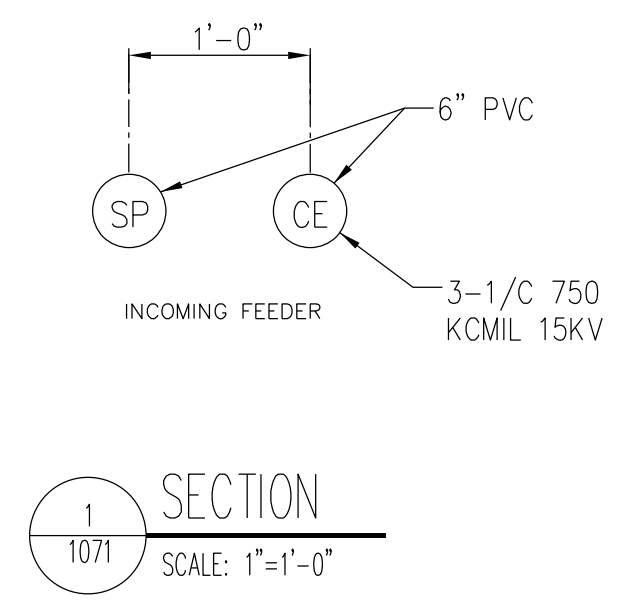
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DATE: JUNE 12, 2017

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LOCATION NAME: RIVERDALE SUBSTATION
TITLE: DUCTBANK PROFILES

CAD FILE NUMBER: SS-17.5-1072.DGN	DISTRICT: MED
SCALE: AS NOTED	SHEET NO. SS-17.5-1072
PROJECT NO. GW4254-57102002	
MILE POST NO. 17.5	

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CABLE TABLE		
CABLE I.D.	FROM	TO
CE	COMED INCOMING LINE	15KV AC SWITCHGEAR CUBICLE 2 OR 8
P1, P2, ETC.	CATHODE BREAKERS IN DC SWITCHGEAR	DC SWITCHGEAR IN TIE STATION
N1, N2, ETC.	RECTIFIER #1 OR #2	NEGATIVE ENCLOSURE ON TOP OF NEGATIVE MANHOLE
C3N	NEGATIVE ENCLOSURE ON TOP OF NEGATIVE MANHOLE	TRACK-RUNNING RAIL
C1, C2	CONTROL ROOM	SCADA IN TIE STATION
C3, C4	CATHODE BREAKERS IN DC SWITCHGEAR	SWITCH ENCLOSURE ON OUTSIDE WALL OF TIE STATION
C5	AC PANEL	NEGATIVE DRAINAGE PANEL
C6	AC PANEL	CONTROL BOX AT TIE BREAKER STATION (AUX PWR TO TIE BKR STATION)

NOTES:
1. ALL DUCT BANKS SHALL BE REINFORCED.

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2	06-08-2018	JMC	HS	ISSUED FOR BID					
1	03-30-2018	JMC	HS	ISSUED FOR ADDENDUM 1					
0	07-28-2017	HS	HS	ISSUED FOR BID					

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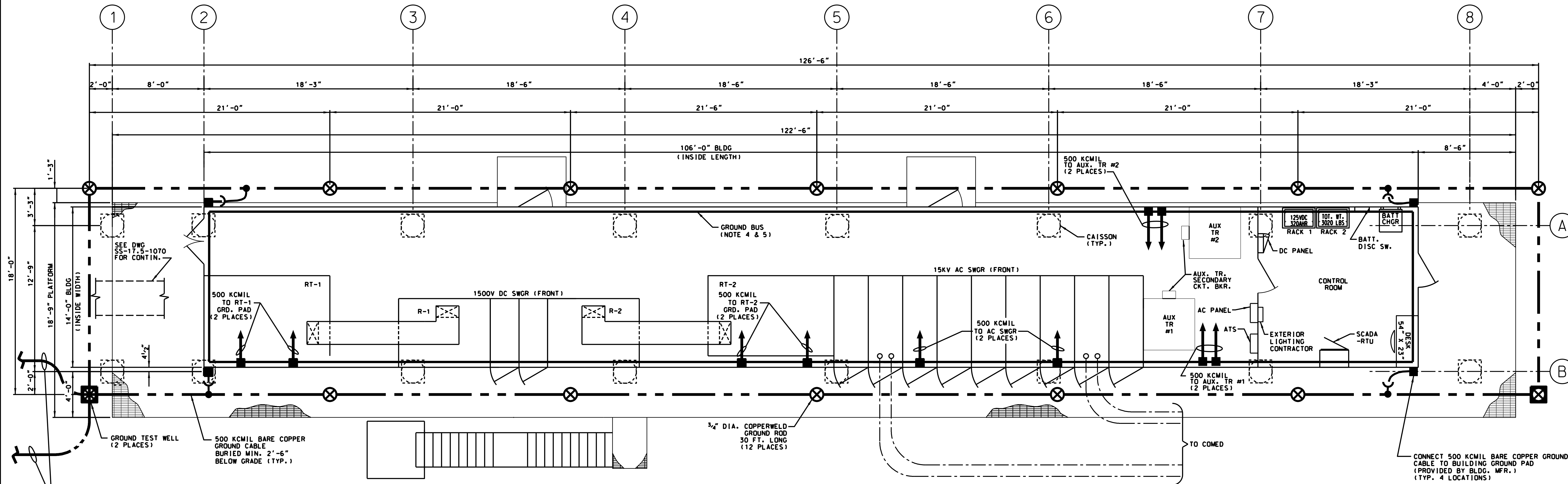
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 METRA P.M.: R. CERANT
 DATE: JUNE 12, 2017

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LOCATION NAME:
RIVERDALE SUBSTATION
 TITLE:
DUCTBANK DETAILS

CAD FILE NUMBER: SS-17.5-1073.DGN
 SCALE: 1" = 1'-0"
 DISTRICT: MED
 PROJECT NO. GW4254-57102002
 SHEET NO. **SS-17.5-1073**
 MILE POST NO. 17.5



PLAN
SCALE: 1/4" = 1'-0"

- LEGEND:**
- GROUND CABLE BURIED IN EARTH OR EMBEDDED IN CONCRETE
 - GROUND CADWELD CONNECTION
 - GROUND BOLTED CONNECTION
 - GROUND CABLE CHANGE OF ELEVATION
 - GROUND ROD
3/4" DIA. 5' LONG COPPERWELD GROUND RODS, MIN. 30 FT. TOTAL LENGTH (6 SECTIONS)
 - GROUND TEST WELL
3/4" DIA. 5' LONG COPPERWELD GROUND RODS, MIN. 30 FT. TOTAL LENGTH (6 SECTIONS)

- NOTES:**
1. BARE COPPER GROUND CABLE SHALL BE BURIED MINIMUM 2'-6" BELOW GRADE.
 2. ALL GROUNDING CONNECTIONS BELOW GRADE SHALL BE MADE USING CADWELD PROCESS. ONLY INSIDE TEST WELL CLAMP CONNECTIONS SHALL BE USED.
 3. GROUND ROD LOCATIONS SHOWN ARE APPROXIMATE. CONTRACTOR MAY RELOCATE RODS AS REQUIRED TO CLEAR FIELD OBSTRUCTIONS.
 4. 1/2" x 2" COPPER GROUND BUS SHALL BE INSTALLED AROUND THE ENTIRE BUILDING ON THE INSIDE FACE OF BUILDING WALL, AND SHALL BE CONNECTED TO GROUND PADS OF THE BUILDING AT FOUR LOCATIONS.
 5. ALL SUBSTATION EQUIPMENT REQUIRING GROUNDING SHALL BE CONNECTED TO SUBSTATION GROUND BUS PER NATIONAL ELECTRICAL CODE.
 6. ALL GROUNDING RISERS ABOVE GRADE FOR CONNECTION TO THE BUILDING GROUND PADS SHALL BE INSTALLED IN THE RIGID STEEL CONDUIT SUPPORTED ALONG THE CAISSONS.

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METRA P.M.: R. CERANT
DATE: JUNE 12, 2017

Metra

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547 W. JACKSON BOULEVARD
CHICAGO, ILLINOIS 60661

LOCATION NAME:
RIVERDALE SUBSTATION

TITLE:
SUBSTATION GROUNDING LAYOUT

CAD FILE NUMBER: SS-17.5-1075.DGN


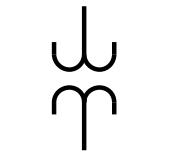
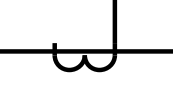









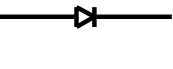
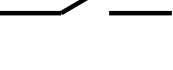

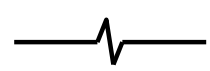



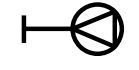
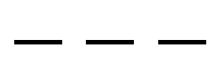
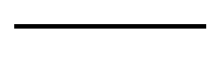
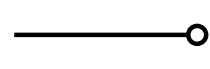
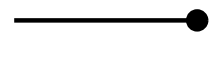







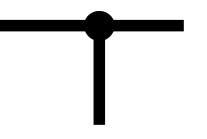

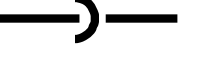



SCALE:
1/4" = 1'-0"

DISTRICT:
MED

PROJECT NO.
GW4254-57102002

MILE POST NO.
17.5

SHEET NO.
SS-17.5-1075

SYMBOLS			GROUNDING NOTES	GENERAL NOTES
<p>GENERAL</p>  POWER TRANSFORMER  POTENTIAL TRANSFORMER  CURRENT TRANSFORMER  AIR CIRCUIT BREAKER  DRAWOUT TYPE  FUSE  RESISTOR  SHUNT  STATION CLASS ARRESTER  DISTRIBUTION CLASS ARRESTER  CAPACITOR FIXED  BATTERY  RECTIFIER  DISCONNECT SWITCH  AUTOMATIC TRANSFER SWITCH	<p>GENERAL CONT'D</p>  MAGNETIC OVERLOAD DEVICE  THERMAL OVERLOAD DEVICE  ELECTRICAL EQUIPMENT, SUCH AS CONTROL PANELS, PULLBOXES, ETC.  JUNCTION BOX (ALSO IDENTIFIED AS J.B. OR JCT. BOX)  POWER OUTLET  CONDUIT EMBEDDED IN CONCRETE OR BURIED IN EARTH.  CONDUIT EXPOSED  CONDUIT TURNING UP OR TOWARD OBSERVER  CONDUIT TURNING DOWN OR AWAY FROM OBSERVER  FLEXIBLE ELECTRICAL CONDUIT <p>METERING/INDICATING DEVICES</p>  AMMETER  VOLTMETER  AMMETER SWITCH  VOLTMETER SWITCH  INDICATING LIGHT AIL-AMBER BIL-BLUE GIL-GREEN RIL-RED WIL-WHITE	<p>GROUNDING</p>  GROUND CABLE BURIED IN EARTH OR EMBEDDED IN CONCRETE  GROUND CADWELD CONNECTION  GROUND BOLTED CONNECTION  GROUND CABLE CHANGE OF ELEVATION  GROUND ROD 3/4" DIA. 5' LONG COPPERWELD GROUND RODS, MIN. 30 FT. TOTAL LENGTH (6 SECTIONS)  GROUND TEST WELL 3/4" DIA. 5' LONG COPPERWELD GROUND RODS, MIN. 30 FT. TOTAL LENGTH (6 SECTIONS)  EXPOSED COPPER GROUND BAR BUS UNLESS OTHERWISE NOTED	<ol style="list-style-type: none"> GROUND CABLE RUNS ARE SHOWN DIAGRAMMATICALLY. EXACT RUNS SHALL BE DETERMINED IN FIELD TO SUIT CONDITIONS. ALL OUTDOOR UNDERGROUND CABLE SHALL BE 500KCMIL BARE COPPER, UNLESS NOTED OTHERWISE. UNDERGROUND GRID TO BE RUN MINIMUM 2'-6" BELOW GRADE AND SHALL BE INSTALLED WITH SUFFICIENT SLACK TO PREVENT DAMAGE DUE TO GROUND FAULTS AND/OR EARTH SETTLEMENT. AT POINTS OF CROSSING, UNDERGROUND CABLE SHALL BE RUN ABOVE FOUNDATION FOOTINGS, EXISTING DUCTBANKS, SEWER LINES AND OTHER BURIED UTILITIES. GROUND WELLS AND RODS SHALL BE INSTALLED AT APPROXIMATE LOCATIONS SHOWN BY DRIVING (NOT DRILLING OR JETTING) USING DRIVING STUD FITTINGS TO ABSORB IMPACT. ALL SURFACES TO BE GROUNDED SHALL BE THOROUGHLY CLEANED TO BARE METAL BEFORE MAKING CONNECTIONS. ALL GROUND GRID CONNECTIONS BELOW GRADE SHALL BE CADWELD TYPE & SHALL BE MADE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. ALL CADWELD CONNECTIONS SHALL BE INSPECTED BEFORE BACKFILLING. IF PUFFY OR POROUS WELDS ARE FOUND, THEY SHALL BE CUT OUT AND THE CONNECTIONS REMADE. ALL GROUNDING CABLE CONNECTIONS TO EQUIPMENT ABOVE GRADE AND INSIDE THE SUBSTATION BUILDING SHALL BE THE BOLTED TYPE. BAR TO BAR AND LUG TO BAR BOLTED CONNECTIONS SHALL BE MADE WITH 1/2" SILICON BRONZE BOLTS, NUTS AND WASHERS. ALL CONNECTIONS SHALL BE MADE ELECTRICALLY CLEAN. SILVER-PLATE ALL BAR AND LUG CONNECTIONS. ALL METAL CONDUITS, EQUIPMENT AND JUNCTION BOXES SHALL BE GROUNDED WITH MINIMUM #2 COPPER CABLE. COAT GROUND CABLE CONNECTIONS TO ALUMINUM TRAY WITH NO-OXIDE COMPOUND. AFTER THE ENTIRE GROUNDING SYSTEM HAS BEEN INSTALLED, INCLUDING RODS, THE SYSTEM SHALL BE TESTED TO MEET SPECIFICATION REQUIREMENTS. 	<ol style="list-style-type: none"> ALL DISTANCES OF EXISTING STRUCTURES SHOWN ON THE DRAWINGS ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY DIMENSIONS BEFORE PROCEEDING WITH THE INSTALLATIONS. CONDUIT USED SHALL BE AS FOLLOWS: <ol style="list-style-type: none"> EXPOSED CONDUIT INSIDE SUBSTATION BUILDING SHALL BE IMC (INTERMEDIATE METAL CONDUIT), UNLESS NOTED OTHERWISE. OUTDOOR CONDUIT FOR GENERAL USE SHALL BE HOT-DIP GALVANIZED RIGID STEEL. CONDUIT FOR TRACTION POWER POSITIVE AND NEGATIVE FEEDERS, WHETHER EXPOSED OR CONCRETE ENCASED, SHALL BE FRE (FIBERGLASS REINFORCED EPOXY) AS SHOWN ON PLANS. CONCRETE ENCASED CONDUIT FOR INCOMING 12KV COMED FEEDERS SHALL BE FRE. (FIBERGLASS REINFORCED EPOXY) WHEN CONDUITS OF VARIOUS SERVICES ARE ENCASED IN COMMON CONCRETE DUCTBANK, THE CONDUIT TYPE IS SPECIFIED ON PLANS. DIRECT BURIED UNDERGROUND CONDUIT SHALL BE HEAVY WALL PVC, TYPE DB-120, MANUFACTURED PER NEMA-6 AND 8. EXPOSED CONDUIT SHALL BE SUPPORTED AT APPROX. 6'-0" INTERVALS (MAXIMUM INTERVAL NOT TO EXCEED 10'-0"). RADIUS OF CURVATURE TO THE INSIDE EDGE OF FIELD BENDS SHALL BE A MINIMUM OF EIGHT-TIMES THE TRADE SIZE OF CONDUIT, UNLESS NOTED OTHERWISE. EXPOSED CONDUIT SHALL, IN GENERAL, BE RUN PARALLEL TO OR AT RIGHT ANGLES TO WALLS AND STRUCTURAL MEMBERS. CONDUITS INSTALLED PARALLEL TO HOT SURFACES SHALL BE RUN A MINIMUM OF 12 INCHES AWAY FROM SUCH SURFACES. AT EQUIPMENT ENCLOSURES, CONDUIT SHALL BE TERMINATED WITH 2-LOCKNUTS AND BUSHINGS OR INSULATED GROUNDING BUSHING INDOORS AND GASKETED CONDUIT HUB PLATES OUTDOORS, EXCEPT WHERE ENCLOSURES ARE FURNISHED WITH INTEGRAL THREADED HUBS. CONDUIT TERMINATIONS AT MOTORS, ELECTRICAL INSTRUMENTS AND WHERE SPECIFIED SHALL BE LIQUIDTITE (SEALTITE TYPE "UA" OR EQUAL) AND SHALL BE INSTALLED WITH LIQUIDTITE CONNECTORS, WITH A MAXIMUM LENGTH OF TWO FEET. ALL INDOOR JCT. & TERM. BOXES SHALL BE NEMA 12 TYPE, ALL OUTDOOR BOXES NEMA 4R TYPE, UNLESS OTHERWISE NOTED, AND SHALL BE LOCATED CLEAR OF INTERFERENCES FOR READY ACCESS. UNLESS SPECIFIED, JUNCTION BOXES SHALL BE SIZED BY THE CONTRACTOR WHEN TOTAL DEGREES OF CONDUIT BENDS EXCEED 270°. CONTRACTOR SHALL ADD AND LOCATE PULL BOX AS NEEDED. WHEREVER THE TERMS "DRAWING" OR "SHEET" ARE USED FOR REFERENCE ON A DRAWING, THE TWO TERMS SHOULD BE CONSIDERED SYNONYMOUS.

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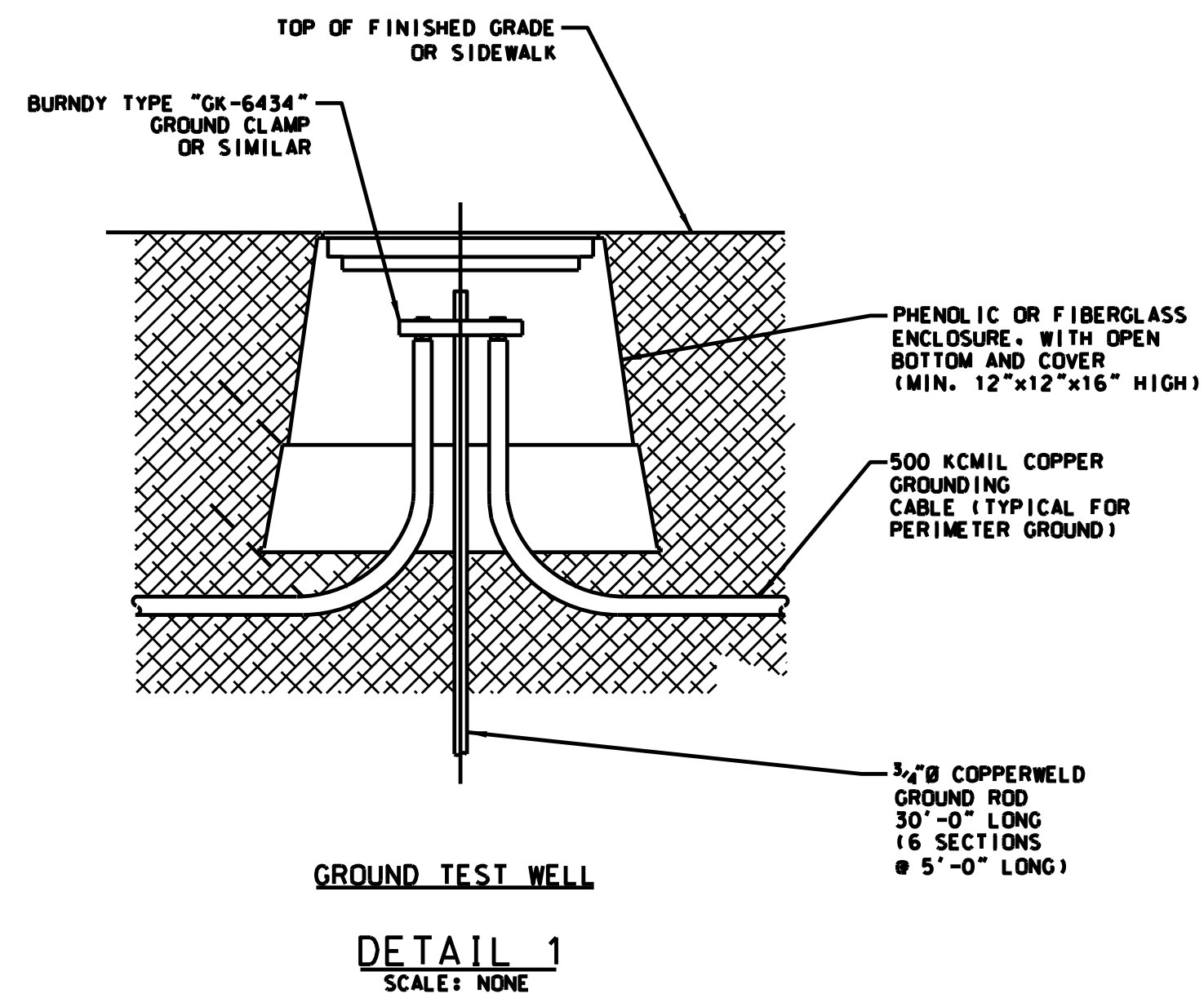
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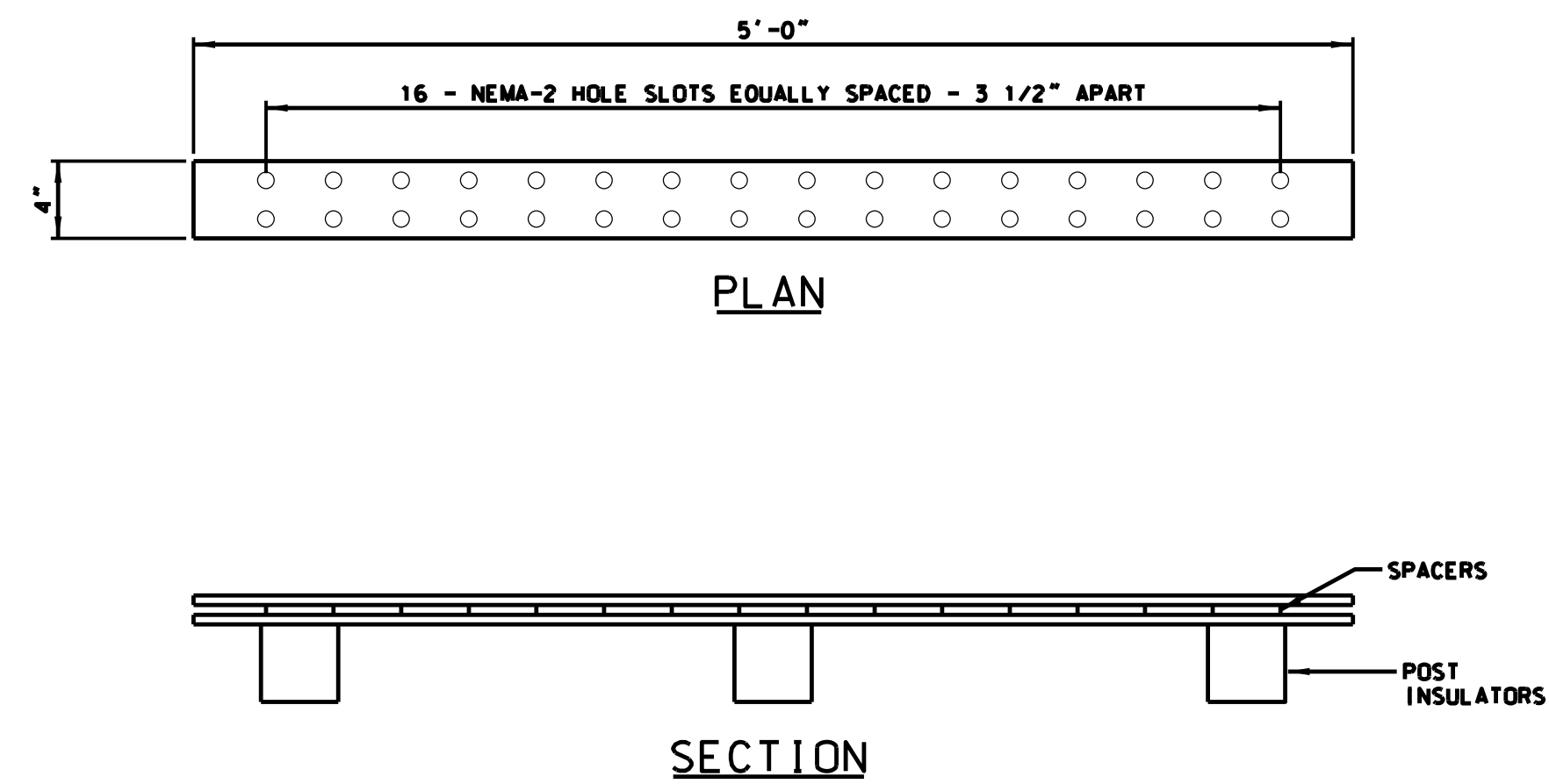
ENGINEERING DEPARTMENT
547 W. JACKSON BOULEVARD
CHICAGO, ILLINOIS 60661

LOCATION NAME: RIVERDALE SUBSTATION
TITLE: ELECTRICAL NOTES & SYMBOLS

CAD FILE NUMBER: SS-17.5-1080.DGN	
SCALE: NTS	DISTRICT: MED
PROJECT NO. GW4254-57102002	SHEET NO. SS-17.5-1080
MILE POST NO. 17.5	



INSTALLATION DETAIL OF NEGATIVE BUS INSIDE WAYSIDE MANHOLE.



NOTES:

1. INSTALL NEGATIVE BUS 12" BELOW MANHOLE CEILING
2. SILVER PLATED NEGATIVE COPPER BUS SHALL BE 5 FEET LONG; WITH (2)-1/2" X 4" BUS BARS WITH 1/2" SPACER RATED FOR MINIMUM 4000 AMPS.
3. BUS BARS SHALL BE MOUNTED ON 5KV POST INSULATORS INSTALLED ON UNISTRUT MOUNTED ON MANHOLE WALL.
4. PROVIDE NEMA-2 NOLE PATTERN SLOT EQUALLY SPACED 3 1/2" APART.
5. INSTALL VIEW WINDOWS IN MANHOLE COVER.

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REV	DATE	BY	APP	DESCRIPTION	REV	DATE	BY	APP	DESCRIPTION
2	06-08-2018	JMC	HS	ISSUED FOR BID					
1	03-30-2018	JMC	HS	ISSUED FOR ADDENDUM 1					
0	07-28-2017	HS	HS	ISSUED FOR BID					

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 CHECKED: FM
 METRA P.M.: R. CERANT
 DATE: JUNE 12, 2017



LOCATION NAME:
RIVERDALE SUBSTATION

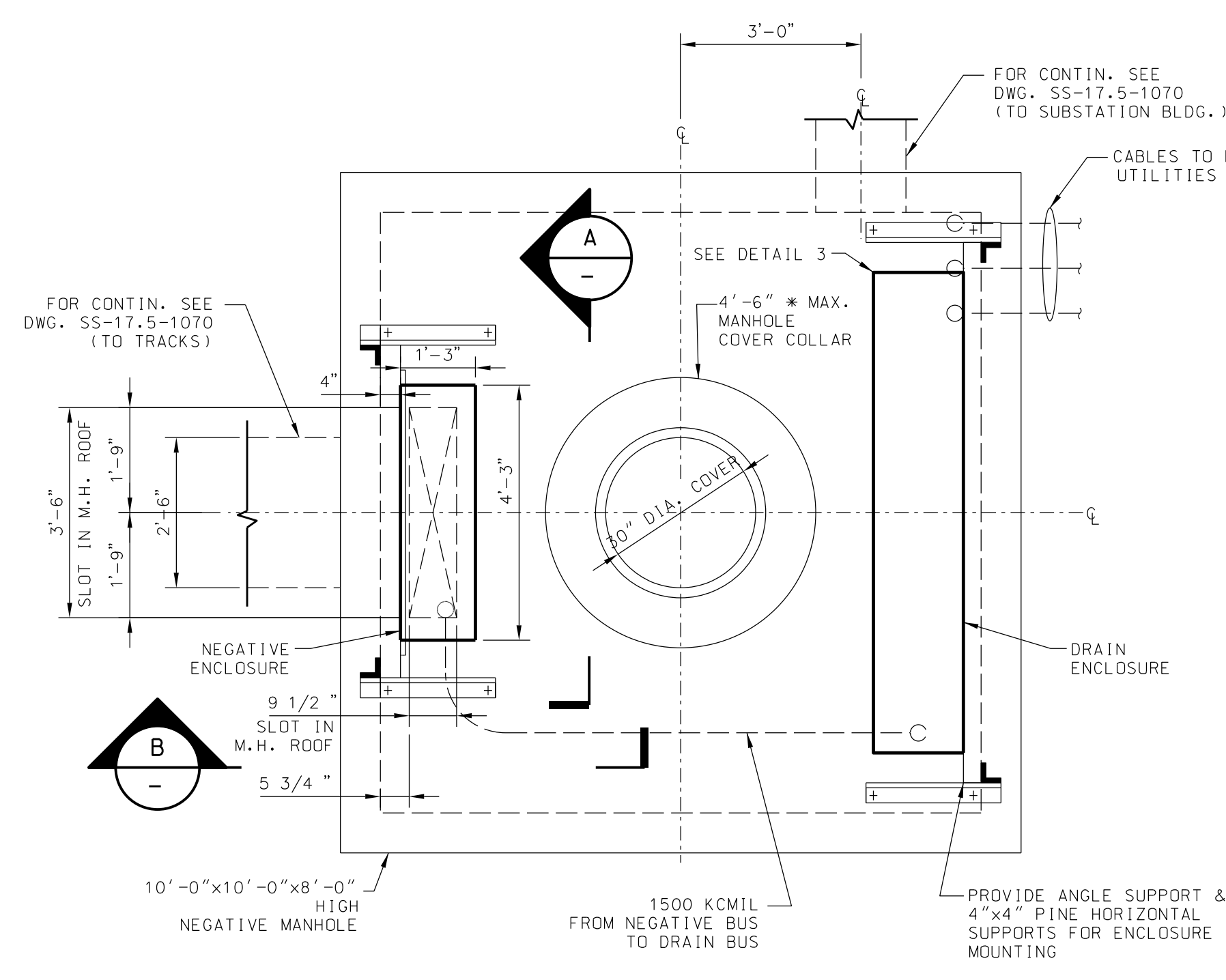
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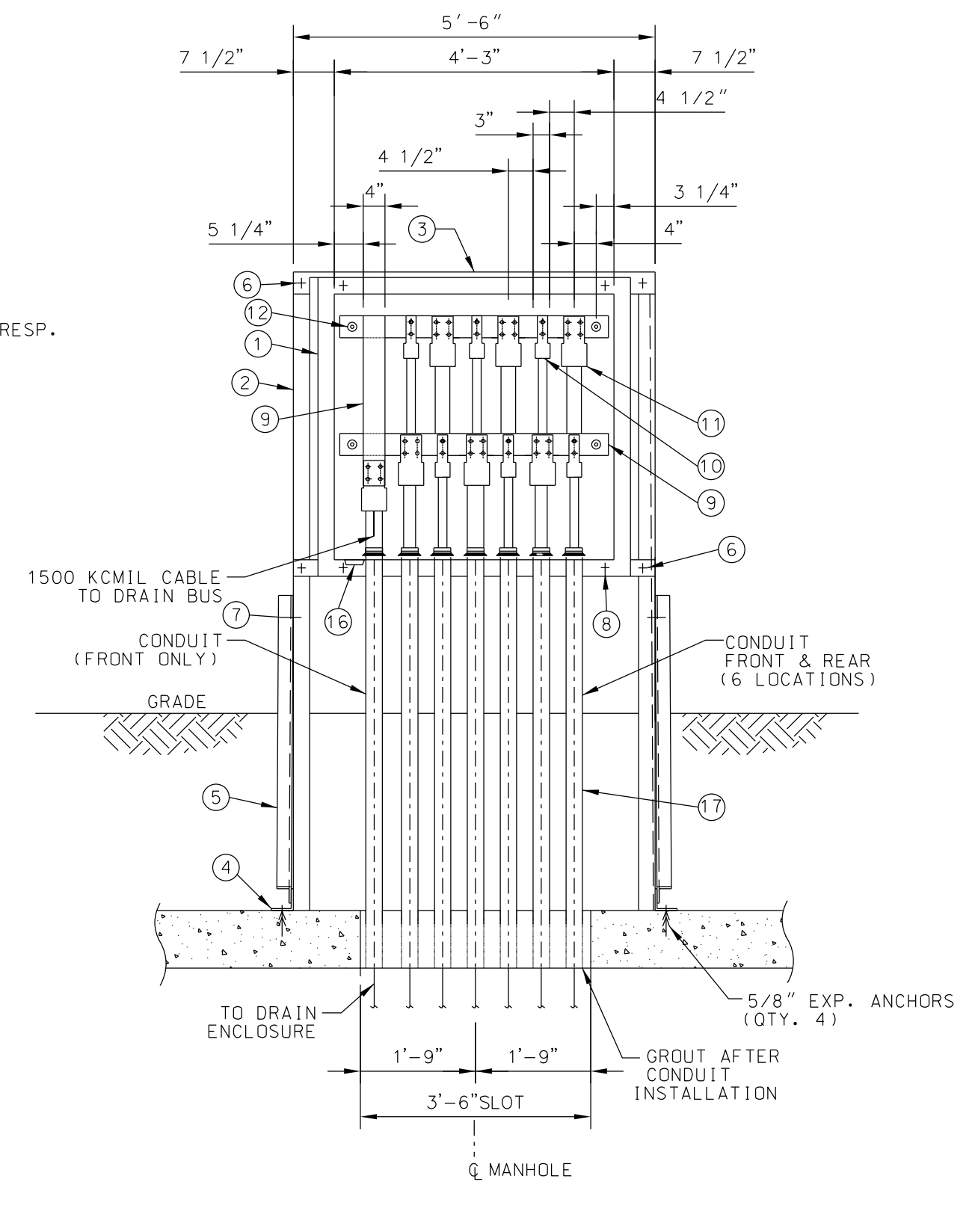
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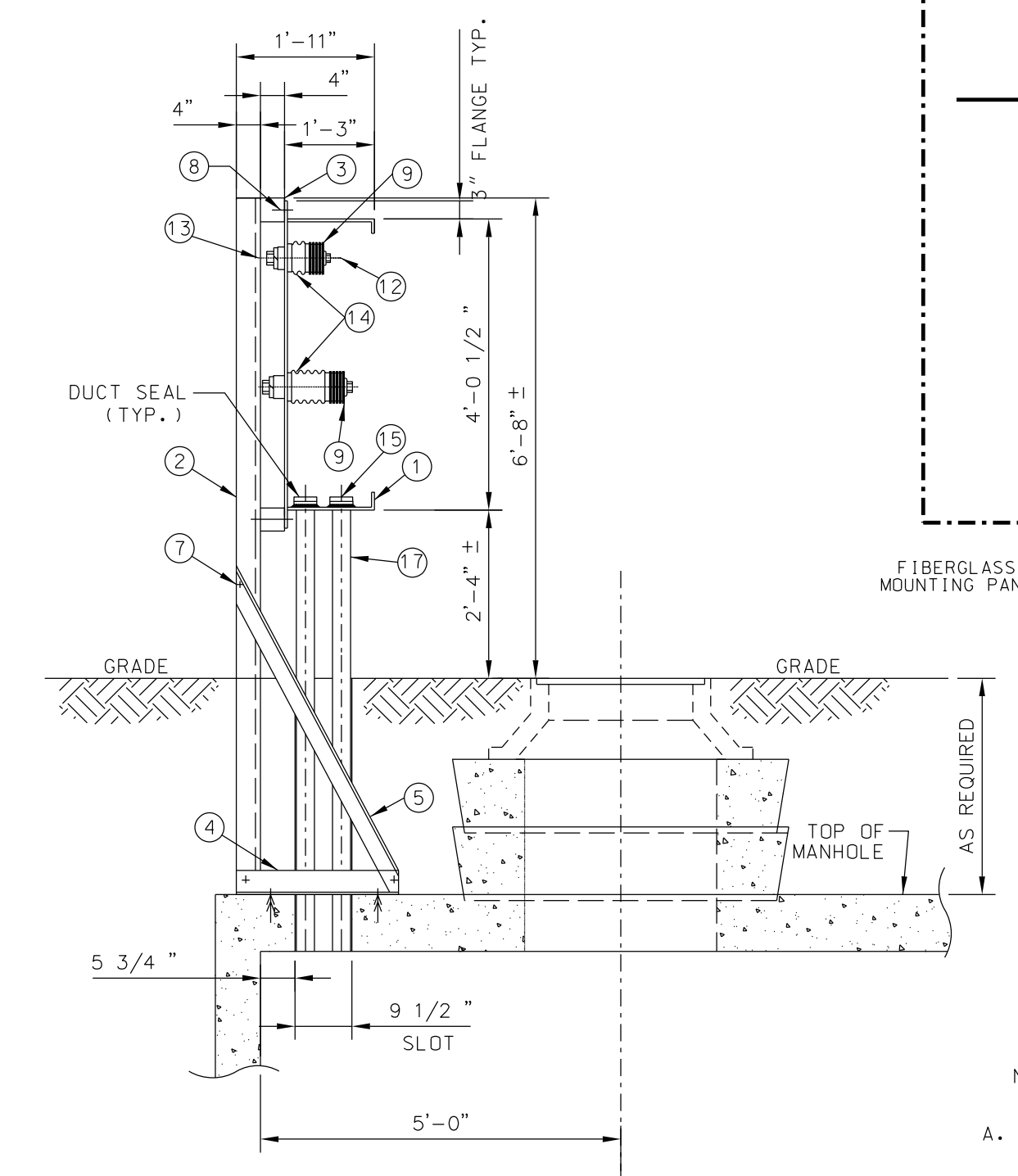
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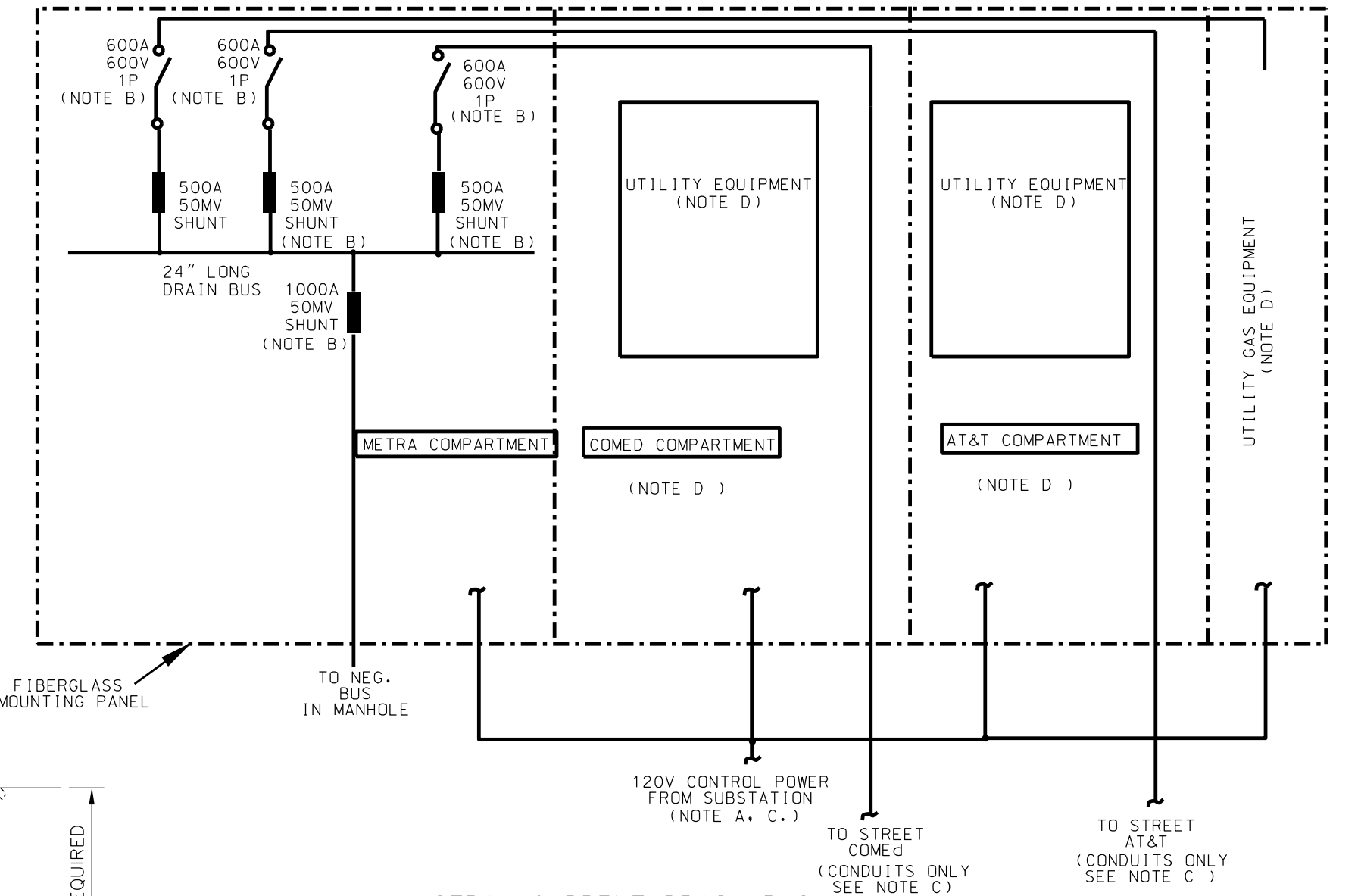
NEGATIVE MANHOLE PLAN
SCALE: 1/2"=1'-0"



ELEVATION
SCALE: 1/2"=1'-0"



SECTION
SCALE: 1/2"=1'-0"



STRAY CURRENT DRAIN BUS EQUIPMENT MTG. PANEL (DRAIN ENCLOSURE)
(SEE NOTES A, B, C, D.)

DETAIL
SCALE: NONE

NOTES:

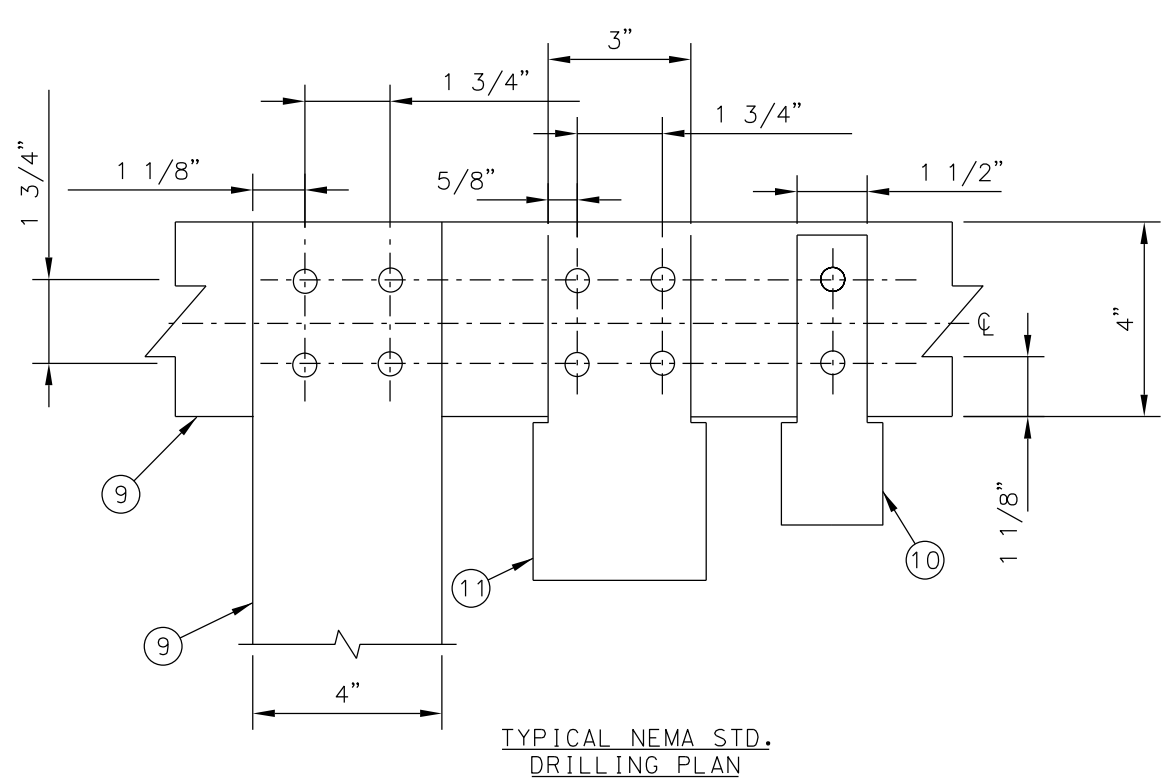
- A. THE CONTRACTOR SHALL PROVIDE A FIBERGLASS MOUNTING PANEL FOR THE UTILITIES DRAIN EQUIPMENT. THE NEW PANEL SHALL HAVE FOUR (4) COMPARTMENTS ONE EACH FOR METRA, AT&T, GAS, AND COMED. EACH COMPARTMENT SHALL BE 42"X24" WITH 120V, 15A DUPLEX OUTLET IN EACH COMPARTMENT.
- B. THE CONTRACTOR SHALL PROVIDE THE FOUR (4) SHUNTS AND THREE (3) DISCONNECT SWITCHES AS PER THIS SKETCH. THE DISCONNECT SWITCHES SHALL BE FILINOR TYPE A, CAT A-6716. THE SHUNTS SHALL BE CANADIAN SHUNT IND. E SERIES, MANIGAN SHUNTS. BOTH SHUNTS AND SWITCHES MANUFACTURERS ARE "OR APPROVED EQUAL".
- C. THE STRAY CURRENT CONDUITS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR AND CABLES BY THE UTILITIES. THE 120V CONTROL POWER CIRCUITS SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR.
- D. THE UTILITIES WILL PROVIDE AND INSTALL THEIR DRAINAGE CABLES AND EQUIPMENT ON THIS PANEL.

BILL OF MATERIAL-NEGATIVE BUS ENCLOSURE

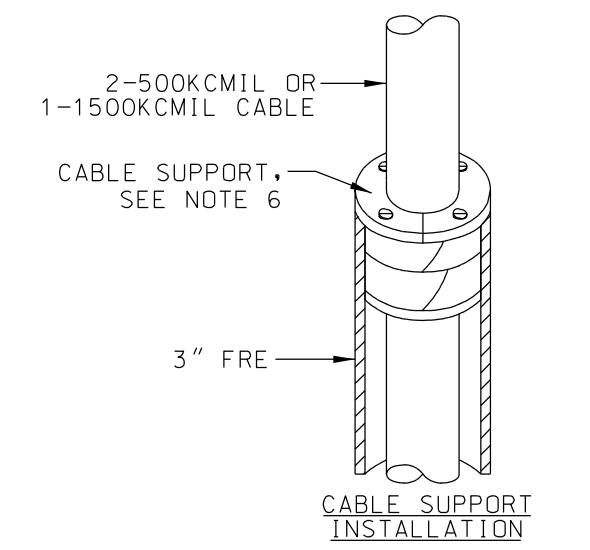
- ① (1) FIBERGLASS ENCLOSURE WITH FLANGE LIP 51" WIDE x 48 1/2" HIGH x 15" MIN. DEEP
- ② (2) 4" x 4" x 3/8" ANGLE, LENGTH AS REQUIRED (ASTM A36 STRUCTURAL STEEL) GALVANIZED
- ③ (2) 4" x 4" PINE 5'-6" LG. TREATED WITH AWPA TYPE P1(95) FOR CREO-PINE
- ④ (2) 4" x 4" x 3/8" ANGLE, 2'-3" LG (ASTM A36 STRUCTURAL STEEL) GALVANIZED
- ⑤ (2) 3" x 3" x 1/4" (BRACE ANGLE), LENGTH AS REQUIRED (ASTM A36 STRUCTURAL STEEL) GALVANIZED
- ⑥ (4) 3/4" Ø THROBOLT, NUT & 2 WASHERS (IN 13/16" Ø HOLES) A307 GALVANIZED
- ⑦ (4) 1/2" Ø BOLT & WASHERS A307 GALVANIZED
- ⑧ (4) 1/2" Ø STAINLESS STEEL BOLT, NUT, SQUARE WASHER & LOCKWASHER
- ⑨ (4) 1/4" x 4" COPPER BUS BARS (44 FT. TOTAL NEEDED)
- ⑩ (12) COPPER ALLOY BOLTED POWER CONNECTOR FOR 500 KCMIL CABLE
- ⑪ (7) COPPER ALLOY BOLTED POWER CONNECTOR FOR 1500 KCMIL CABLE
- ⑫ (4) 5/8" HEX HEAD SILICON BRONZE BOLT WITH STAINLESS STEEL BELLEVILLE WASHER
- ⑬ (4) 3/4" HEX HEAD STAINLESS STEEL BOLT WITH FLAT & SPLIT WASHERS
- ⑭ (2) 7 1/2" & (2) 14" FIBERGLASS REINFORCED STANDOFF INSULATOR CLASS A-40
- ⑮ (13) CABLE SUPPORT, SEE DETAIL 2
- ⑯ (3) DRAIN PLUG
- ⑰ (13) 3" FRE CONDUIT LENGTH AS REQUIRED

NOTES:

- 1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
- 2. PROVIDE KNOCKOUTS IN BOTTOM OF ENCLOSURE FOR 3" FRE CONDUIT AS DIMENSIONED.
- 3. SEAL ALL MOUNTING BOLTS AND ANY PENETRATION THROUGH THE ENCLOSURE WITH RTV SILICON SEALER PER ENCLOSURE MANUFACTURER'S INSTRUCTIONS.
- 4. BUS SHALL BE ADEQUATELY BRACED. SPACING BETWEEN BUS BARS SHALL BE 1/4" AND MAINTAINED ENTIRE LENGTH.
- 5. ENCLOSURE DOORS ARE NOT SHOWN FOR CLARITY.
- 6. FOR CABLE SUPPORT USE CONDUIT SEALING BUSHING TYPE CSBE-300P-SEG (500KCMIL) AND CSBE-300P (1500KCMIL) MANUFACTURED BY O-Z/GEDNEY OR APPROVED EQUAL.
- 7. ALL MILD STEEL STRUCTURAL SHAPES, BOLTS, NUTS, AND WASHERS ARE TO BE GALVANIZED.
- 8. ALL EQUIPMENT SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR UNLESS NOTED OTHERWISE.



DETAIL
SCALE: NONE



DETAIL
SCALE: NONE

PRINTED ON: \$DATES

REV	DATE	BY	APP	DESCRIPTION	REV	DATE	BY	APP	DESCRIPTION
2	06-08-2018	JMC	HS	ISSUED FOR BID					
1	03-30-2018	HS	HS	ISSUED FOR ADDENDUM 1					
0	07-28-2017	HS	HS	ISSUED FOR BID					

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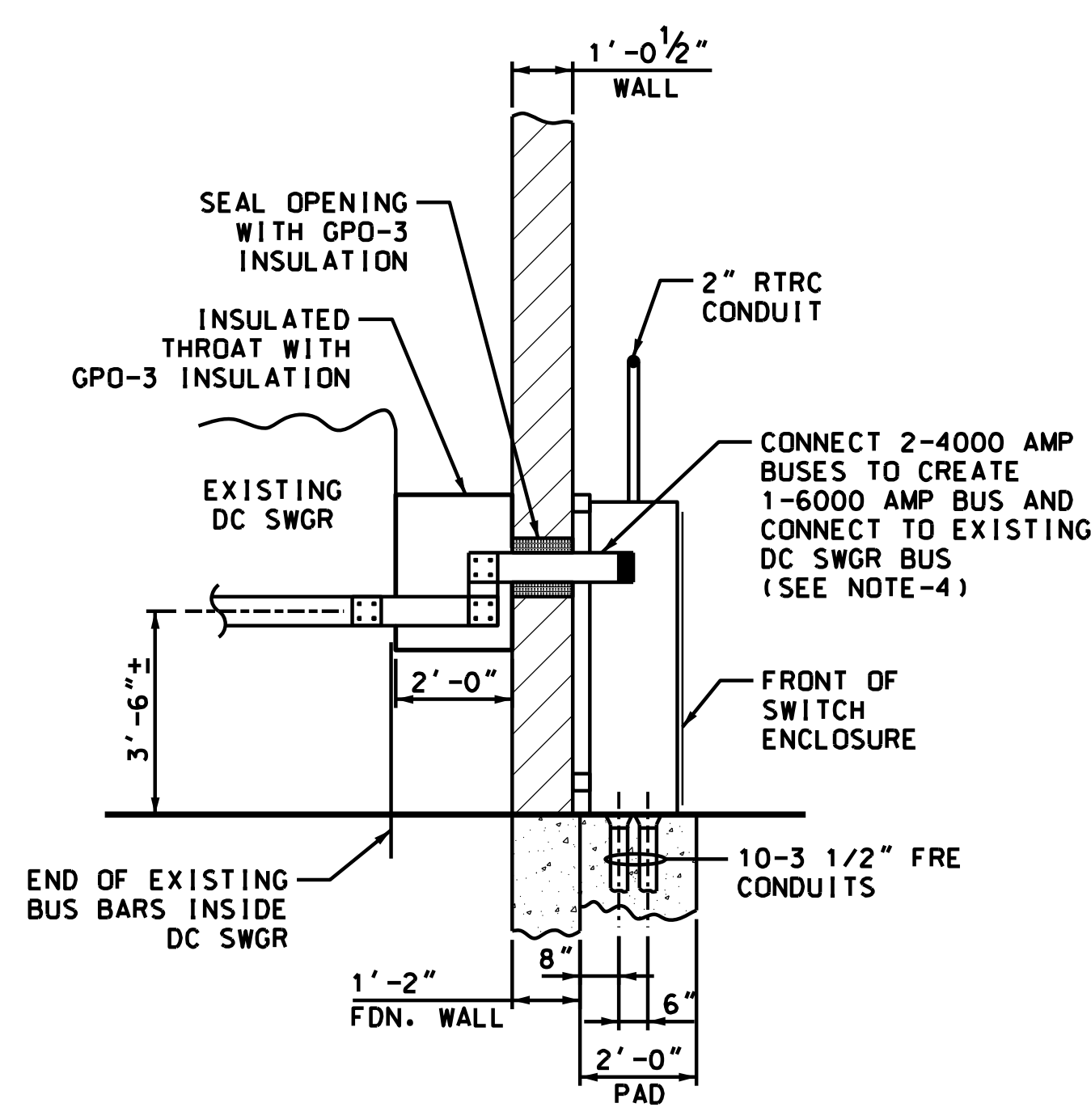
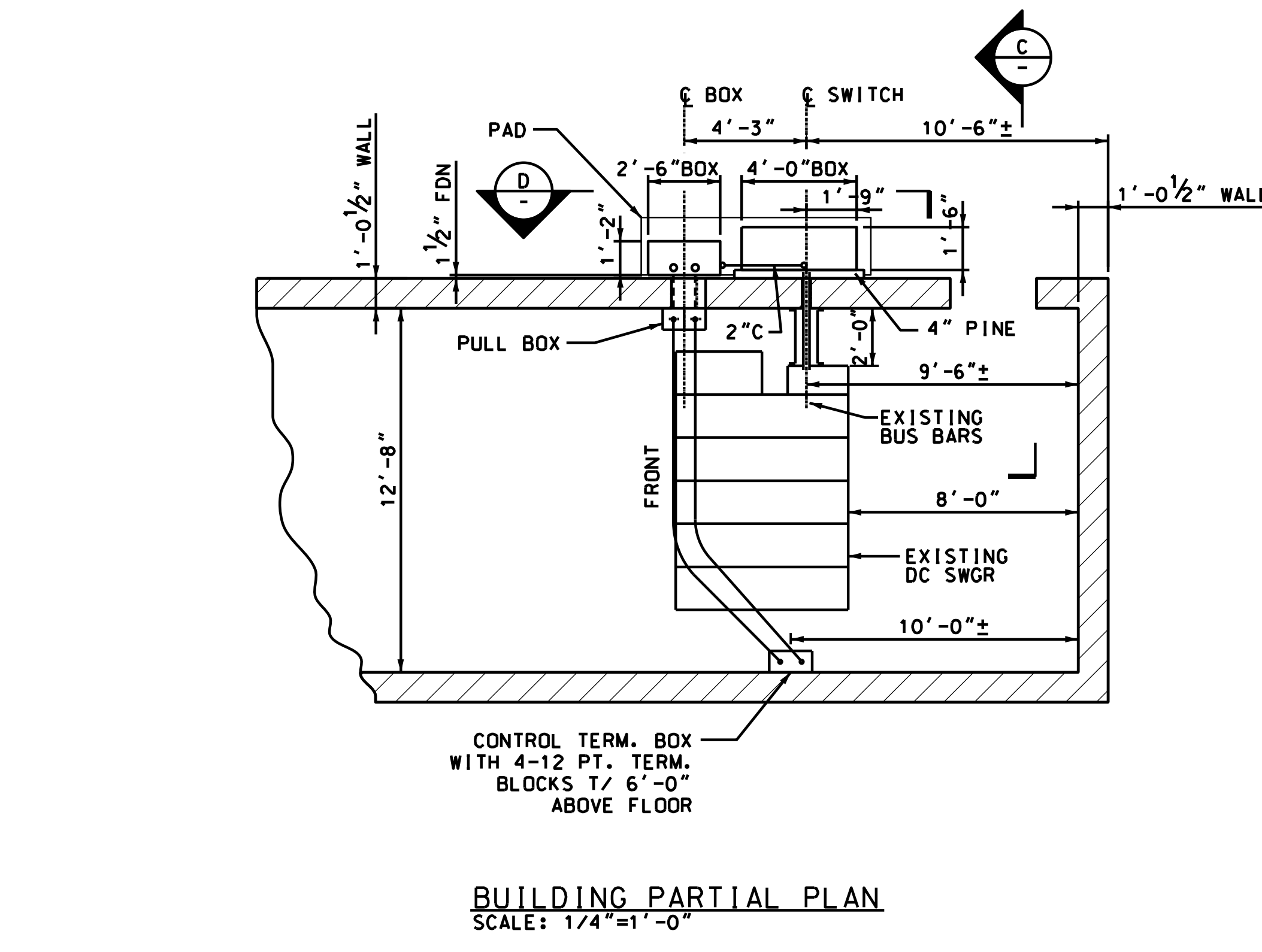
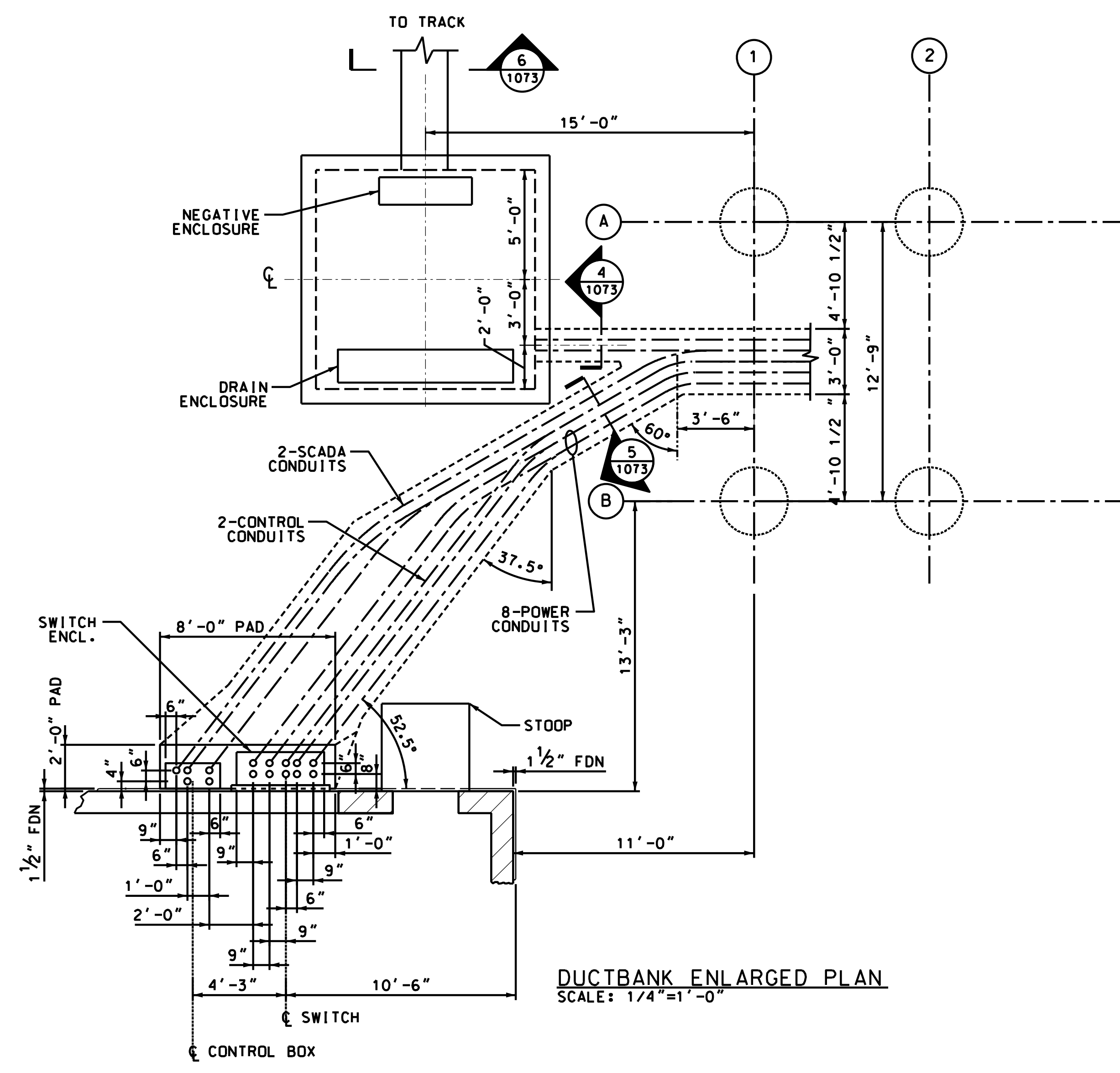
DESIGNED: HS
DRAWN: JMC
CHECKED: FM
METRA P.M.: R. CERANT
DATE: JUNE 12, 2017

Metra

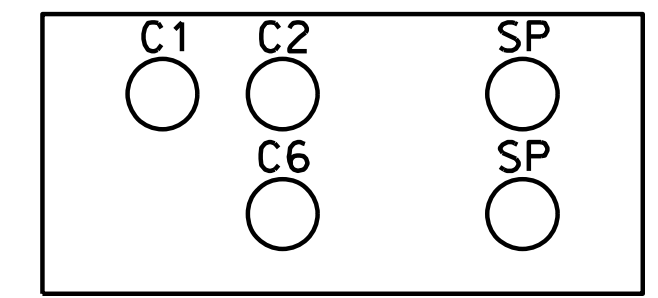
ENGINEERING DEPARTMENT
547 W. JACKSON BOULEVARD
CHICAGO, ILLINOIS 60661

LOCATION NAME: RIVERDALE SUBSTATION
TITLE: NEGATIVE AND DRAIN ENCLOSURES

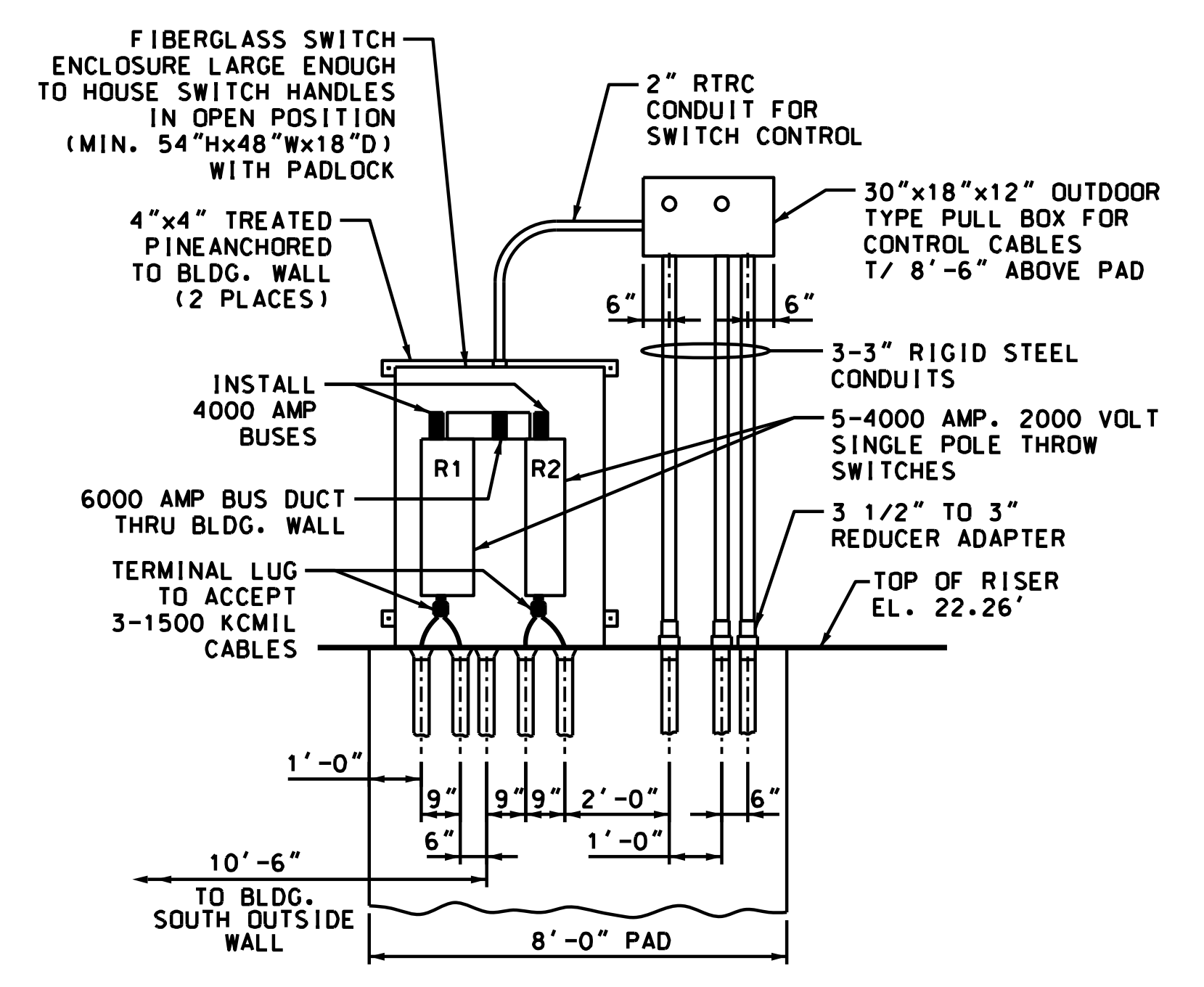
CAD FILE NUMBER: SS-17.5-1082.DGN	DISTRICT: MED
SCALE: AS NOTED	SHEET NO. SS-17.5-1082
PROJECT NO. GW4254-57102002	
MILE POST NO. 17.5	



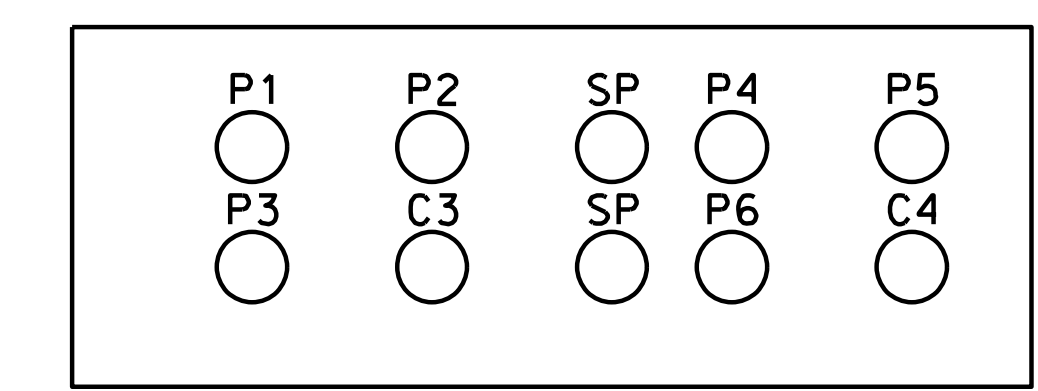
(C) ELEVATION
SCALE: 3/8"=1'-0"



ENLARGED PLAN OF CONDUIT RISER FOR THE PULL BOX



(D) SWITCHBOX FRONT VIEW
SCALE: 3/8"=1'-0"



ENLARGED PLAN OF CONDUIT OPENINGS FOR THE SWITCH ENCLOSURE

- NOTES:**
- CONTRACTOR SHALL FIELD VERIFY ALL EXISTING INSTALLATIONS AND MAKE NECESSARY ADJUSTMENTS.
 - ALL EQUIPMENT SHOWN IS NEW, UNLESS IDENTIFIED AS EXISTING.
 - FOR CABLE TABULATION SEE DWG. SS-17.5-1073.
 - THE 600 AMP BUS BETWEEN THE SWITCH ENCLOSURE AND EXISTING DC SWITCHGEAR SHALL BE INSTALLED IN A WEATHERPROOF, WATER TIGHT FIBERGLASS DUCT.

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REV	DATE	BY	APP	DESCRIPTION
0	07-28-2017	HS	HS	ISSUED FOR BID

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DESIGNED: HS

DRAWN: JMC

CHECKED: FM

METRA P.M.: R. CERANT

DATE: JUNE 12, 2017



LOCATION NAME:
RIVERDALE SUBSTATION

TITLE:

**ENLARGED PLANS,
ELEVATIONS AND DETAILS**

CAD FILE NUMBER: SS-17.5-1085.DGN

SCALE: AS NOTED

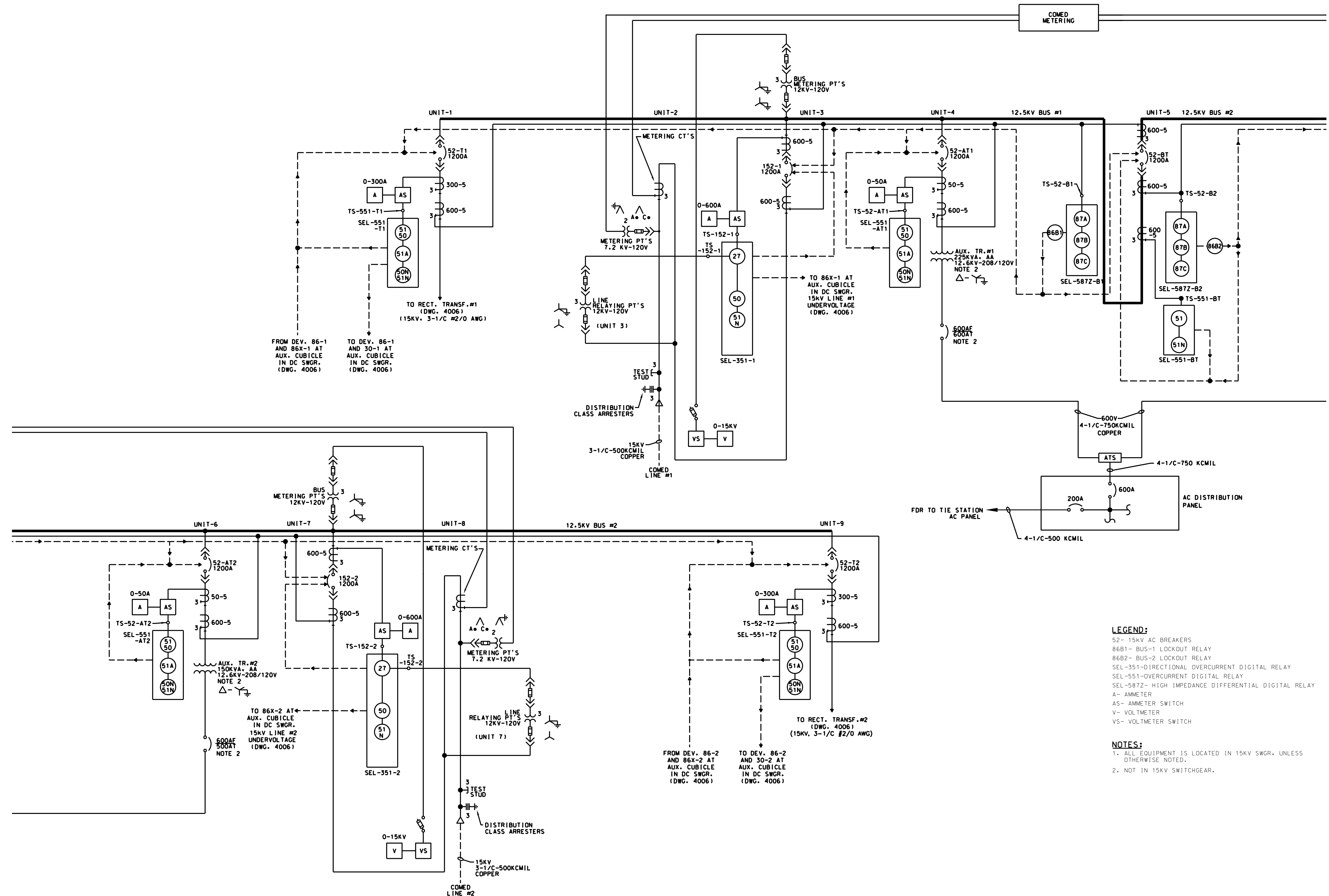
DISTRICT: MED

PROJECT NO. GW4254-67102002

SHEET NO.

SS-17.5-1085

MILE POST NO. 17.5



CONTINUED BELOW

CONTINUED FROM ABOVE

- LEGEND:**
- 52- 15KV AC BREAKERS
 - 86B1- BUS-1 LOCKOUT RELAY
 - 86B2- BUS-2 LOCKOUT RELAY
 - SEL-351-DIRECTIONAL OVERCURRENT DIGITAL RELAY
 - SEL-551-OVERCURRENT DIGITAL RELAY
 - SEL-587Z- HIGH IMPEDANCE DIFFERENTIAL DIGITAL RELAY
 - A- AMMETER
 - AS- AMMETER SWITCH
 - V- VOLTMETER
 - VS- VOLTMETER SWITCH

- NOTES:**
1. ALL EQUIPMENT IS LOCATED IN 15KV SWGR, UNLESS OTHERWISE NOTED.
 2. NOT IN 15KV SWITCHGEAR.

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 METRA P.M.: R. CERANT
 DATE: JUNE 12, 2017



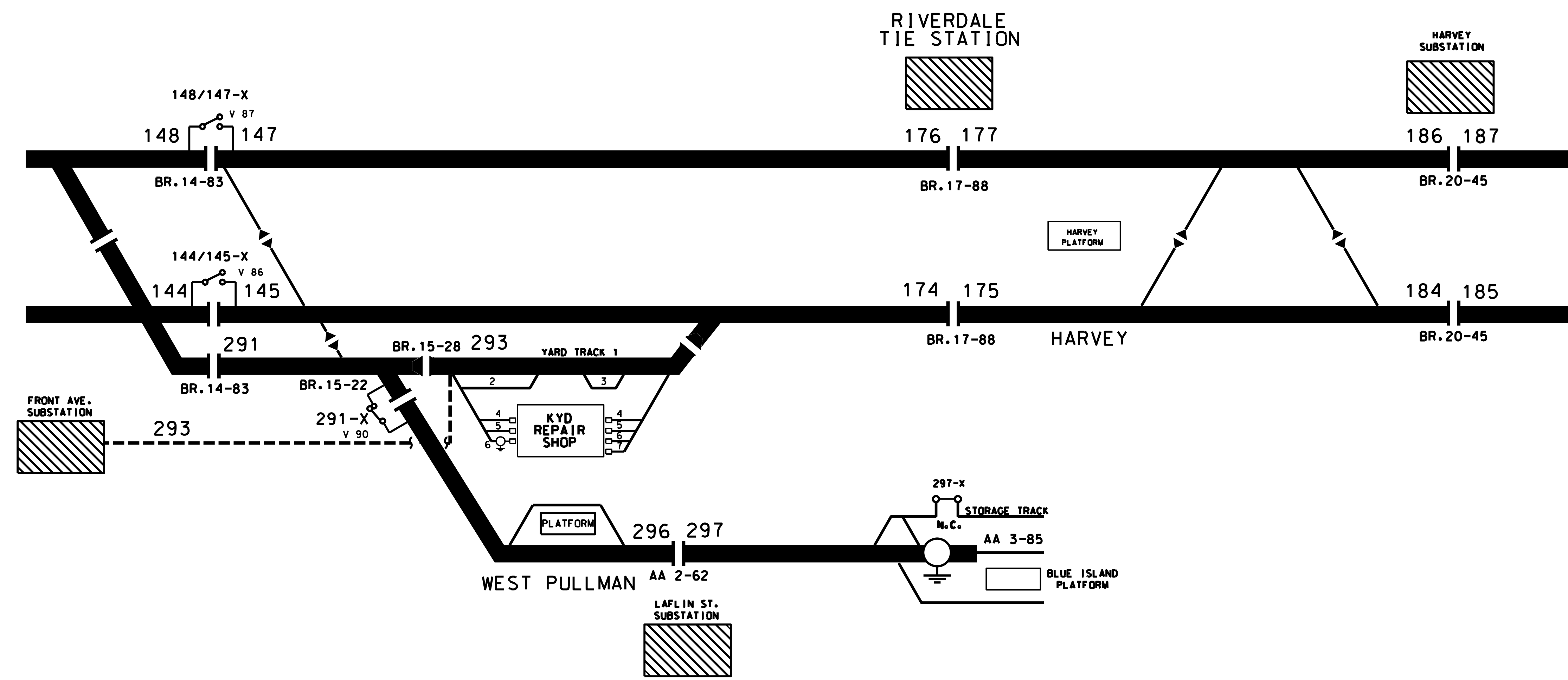
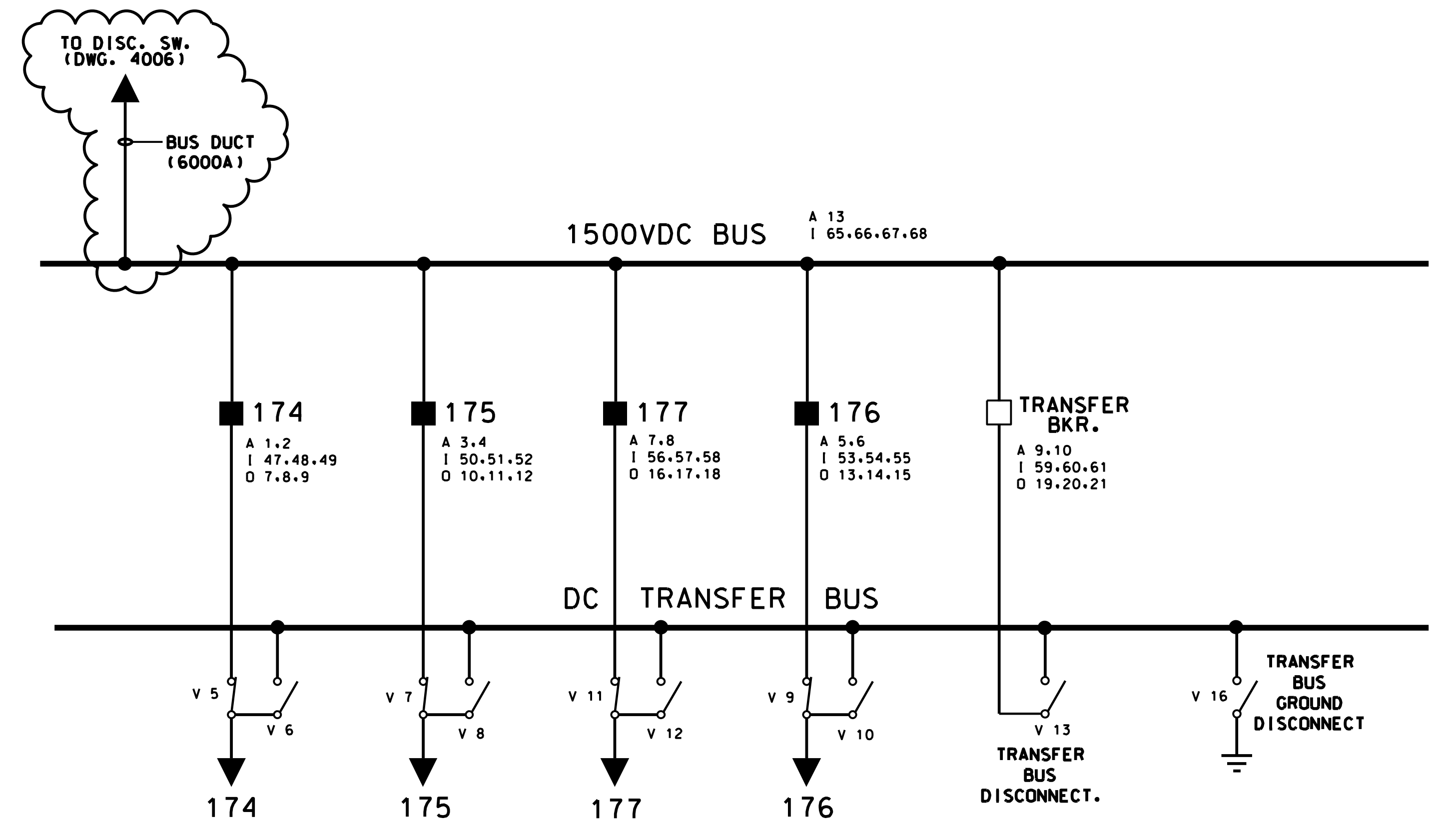
LOCATION NAME:
RIVERDALE SUBSTATION
 TITLE:
12.5KV AC SINGLE LINE DIAGRAM

CAD FILE NUMBER: SS-17.9-4001.DGN
 SCALE: NTS
 PROJECT NO. GW4254-57102002
 MILE POST NO. 17.5
 DISTRICT: MED
 SHEET NO. **SS-17.5-4001**

RIVERDALE TIE STATION

FEEDER STRUCTURE 17-88

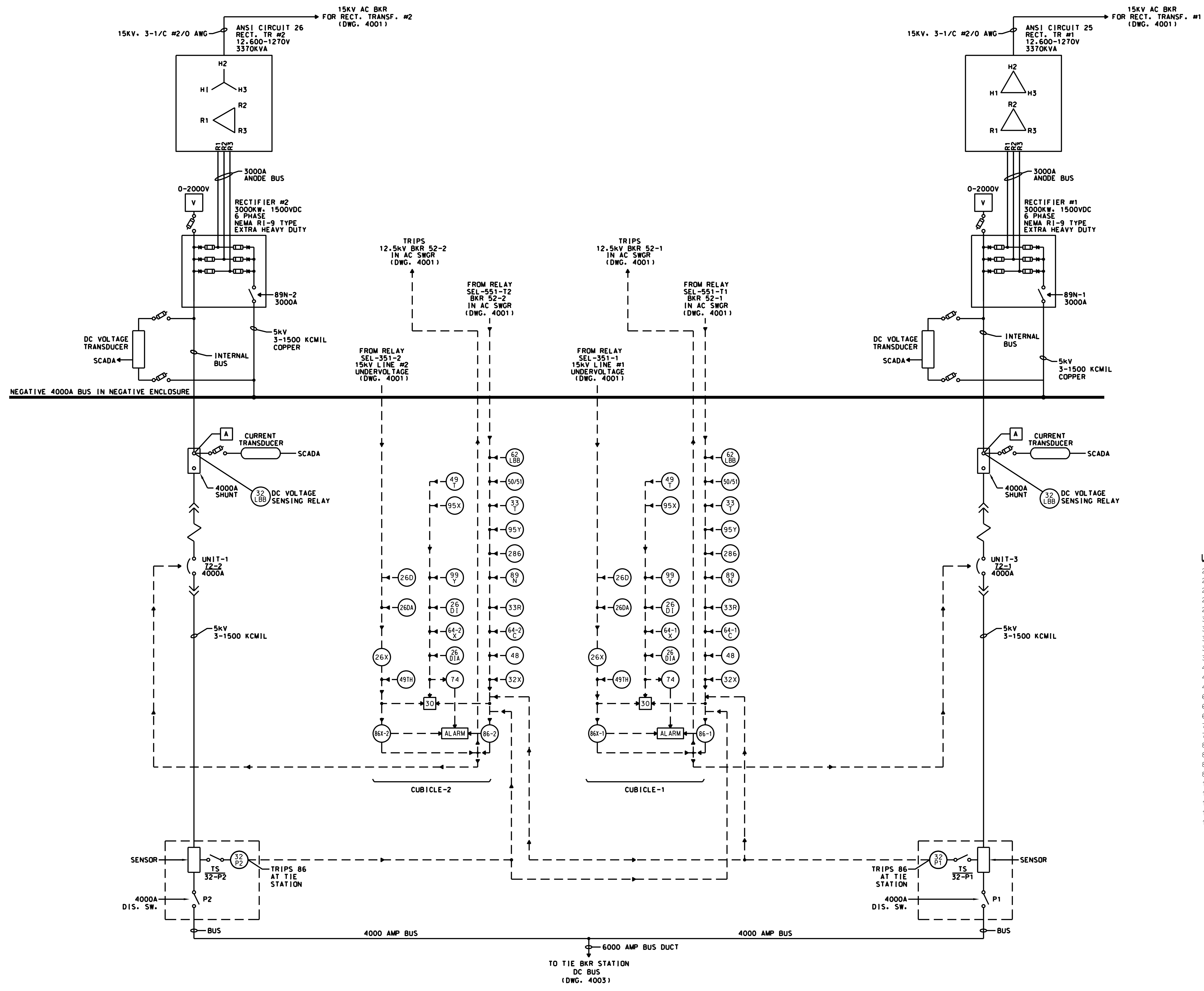
CIRCUIT WITHIN THE CLOUD INDICATES NEW WORK UNDER THIS CONTRACT



BY LDP →

REV	DATE	DESCRIPTION	BY
-	07/28/17	ISSUED FOR BID	HS
-	2/12	MINOR CORRECTIONS	WPS
-	11/11	REVISED FOR SOUTH SHORE KENSINGTON INTERLOCKER PROJECT - AS-BUILTS.	WPS
-	3/04	REVISED DWG. NOS.	WPS
-	5/2/99	ADAPTED #4003 FROM DC GRAPHIC DISPLAY DWG.	RAS

Metra ENGINEERING DEPARTMENT CHICAGO, ILLINOIS	
TRACTION POWER ONE LINE DIAGRAM	
RIVERDALE TIE STATION	
SCALE: NONE	DATE: 10/95
FILE NUMBER: F:\ELEC\EML\RIVERDALE\4003.dgn	DESIGNED: WDS
CHECKED: RAS	APPROVED: WPS
DISTRICT: METRA ELECT.	PROJECT NUMBER: SS-17.5-4003



LEGEND:

- 26D- RECT. POS. OVERTEMP-SECOND STEP
- 26DA- RECT. NEG. OVERTEMP- SECOND STEP
- 26D1- RECT. POS. OVERTEMP-FIRST STEP
- 26D1A- RECT. NEG. OVERTEMP- FIRST STEP
- 26X- AUXILIARY TO 26D AND 26DA
- 30- RECTIFIER ANNUNCIATOR
- 32- REVERSE CURRENT TRIP DEVICE
- 32LBB- CURRENT SENSING RELAY FOR DEV.32 CXT
- 33R- RECT. COMPT.DOOR POSITION SWITCH
- 33T- RECT. TR. DOOR POSITION SWITCH
- 48- INCOMPLETE SEQ. RELAY
- 49T- TRANS. WINDING OVERTEMP-FIRST STEP
- 49TH-TRANS. WINDING OVERTEMP-SECOND STEP
- 62LBB- BREAKER BACK-UP TIMING RELAY
- 64M- RECT. GRD. REL.-GROUNDED STRUCTURE
- 64X- RECT. GRD. REL.-HOT STRUCTURE
- 72- CATHODE BREAKER
- 74- TROUBLE ALARM RELAY
- 86S- LOCKOUT RELAY-DC SWGR STRUCTURE HOT
- 86X- CONDITIONAL LOCKOUT RELAY
- 86-HAND RESET LOCKOUT RELAY
- 89N- RECTIFIER NEG. DISC. SW.
- 129- LOAD MEASURING CONTACTOR
- 150RR- RATE OF RISE DIGITAL RELAY
- 164M- DC SWGR GRD RELAY-GROUNDED STRUCTURE
- 164X- DC SWGR GRD RELAY-HOT STRUCTURE
- 164XX-AUX RELAY TO DEVICE 164X

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REV	DATE	BY	APP	DESCRIPTION
0	07-28-2017	HS	HS	ISSUED FOR BID

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DATE: JUNE 12, 2017

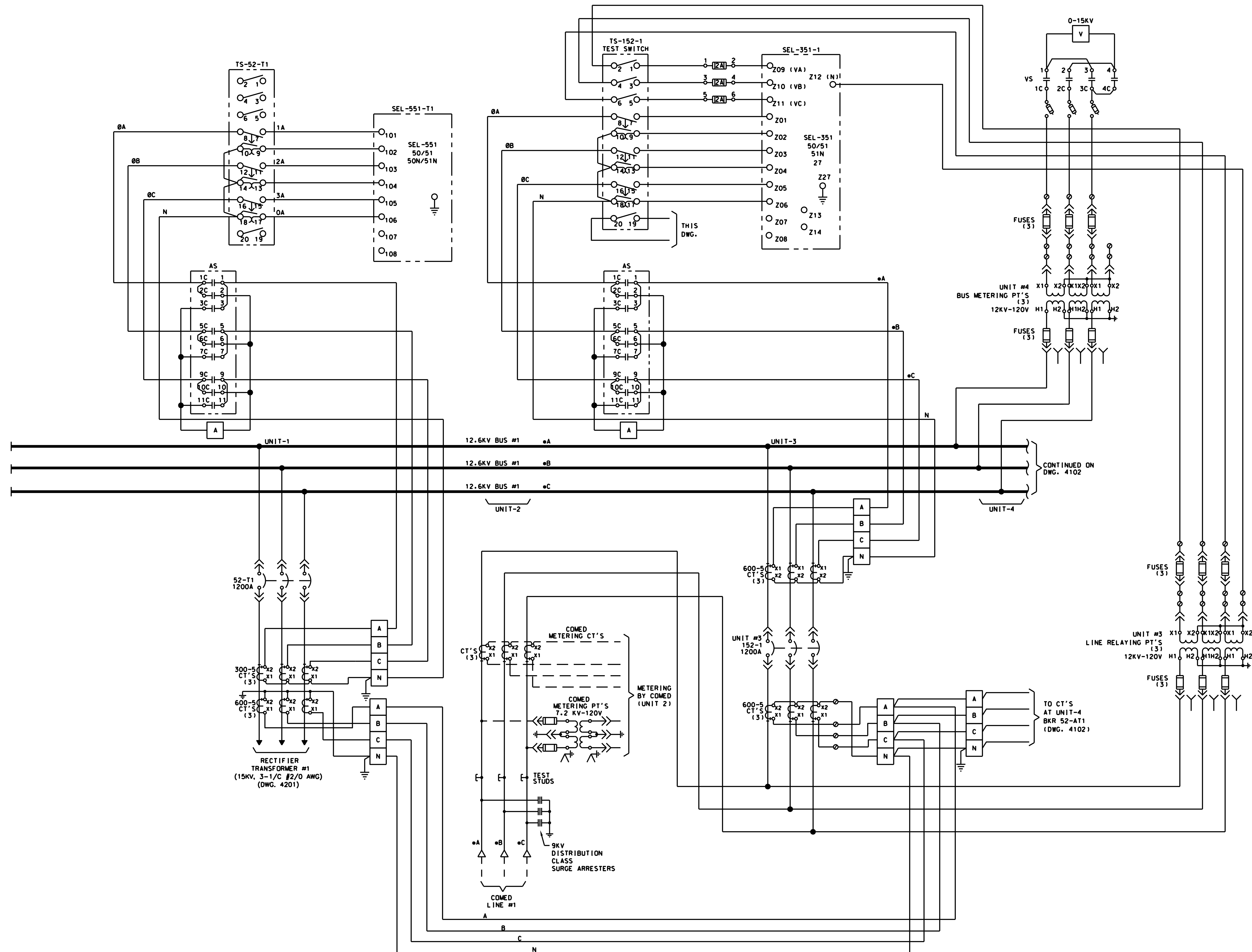
ENGINEERING DEPARTMENT
547 W. JACKSON BOULEVARD
CHICAGO, ILLINOIS 60661

LOCATION NAME: RIVERDALE SUBSTATION

TITLE: TRANSF'S, RECTIFIERS & DC SWGR SINGLE LINE DIAGRAM

CAD FILE NUMBER: SS-17.5-4006.DGN

SCALE: NTS	DISTRICT: MED
PROJECT NO. GW4254-57102002	SHEET NO. SS-17.5-4006
MILE POST NO. 17.5	



VOLTMETER

GE TYPE: 165B1CF11

CONTACTS HANDLE END	POSITIONS			
	3-1	2-3	1-2	DF
1	X		X	
2		X	X	
3			X	
4	X			

GE TYPE: 165B1CF15

CONTACTS HANDLE END	POSITIONS							
	3	•	DF	•	2	•	DF	1
1	X	X	X	X	X	X	X	X
2								X
3								X
5	X	X	X	X		X	X	X
6				X	X	X		
7				X	X	X		
9		X	X	X	X	X	X	X
10	X	X						
11	X	X						

LEGEND:
 52 OR 152- 15KV AC BREAKER
 SEL-351- DIRECTIONAL OVERCURRENT DIGITAL RELAY
 SEL-551- OVERCURRENT DIGITAL RELAY
 TS/52 OR 152- TEST SWITCH
 AS- AMMETER SWITCH
 A- AMMETER
 VS-VOLTMETER SWITCH
 V- VOLTMETER

NOTES:
 1. ALL EQUIPMENT IS LOCATED IN 15KV SWGR. UNLESS OTHERWISE NOTED.
 2. ALL CTS SHALL BE WIRED TO A SHORTING TERMINAL BLOCK PRIOR TO CONNECTING TO A DEVICE.

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REV	DATE	BY	APP	DESCRIPTION
0	07-28-2017	HS	HS	ISSUED FOR BID

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 CHECKED: FM
 METRA P.M.: R. CERANT
 DATE: JUNE 12, 2017

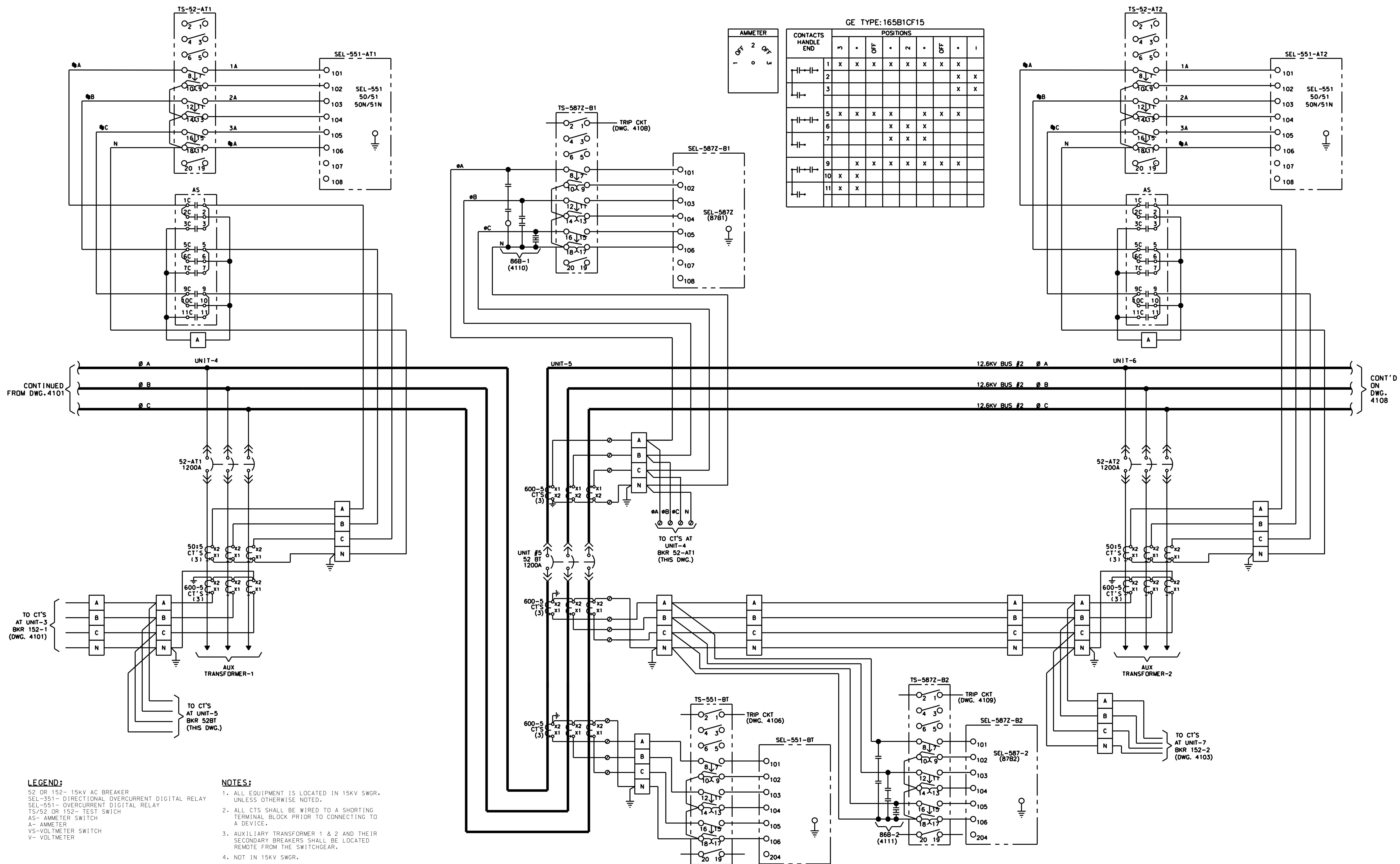
ENGINEERING DEPARTMENT
 547 W. JACKSON BOULEVARD
 CHICAGO, ILLINOIS 60661

LOCATION NAME:
RIVERDALE SUBSTATION

TITLE:
12.5KV AC THREE LINE DIAGRAM SHEET 1 OF 3

CAD FILE NUMBER: SS-17.5-4101.DGN

SCALE:	DISTRICT:
NTS	MED
PROJECT NO. GW4254-57102002	SHEET NO. SS-17.5-4101
MILE POST NO. 17.5	



AMMETER

OFF	2	OFF
1	0	3

GE TYPE: 165B1CF15

CONTACTS	HANDLE	POSITIONS						
		3	•	OFF	•	2	•	1
1	X	X	X	X	X	X	X	X
2								X
3								X
5	X	X	X	X	X	X	X	X
6				X	X	X		
7				X	X	X		
9	X	X	X	X	X	X	X	X
10	X	X						
11	X	X						

LEGEND:
 52 OR 152- 15KV AC BREAKER
 SEL-351- DIRECTIONAL OVERCURRENT DIGITAL RELAY
 SEL-551- OVERCURRENT DIGITAL RELAY
 TS/52 OR 152- TEST SWITCH
 AS- AMMETER SWITCH
 A- AMMETER
 VS-VOLTMETER SWITCH
 V- VOLTMETER

NOTES:
 1. ALL EQUIPMENT IS LOCATED IN 15KV SWGR, UNLESS OTHERWISE NOTED.
 2. ALL CTS SHALL BE WIRED TO A SHORTING TERMINAL BLOCK PRIOR TO CONNECTING TO A DEVICE.
 3. AUXILIARY TRANSFORMER 1 & 2 AND THEIR SECONDARY BREAKERS SHALL BE LOCATED REMOTE FROM THE SWITCHGEAR.
 4. NOT IN 15KV SWGR.

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0	07-28-2017	HS	HS	ISSUED FOR BID
REV	DATE	BY	APP	DESCRIPTION



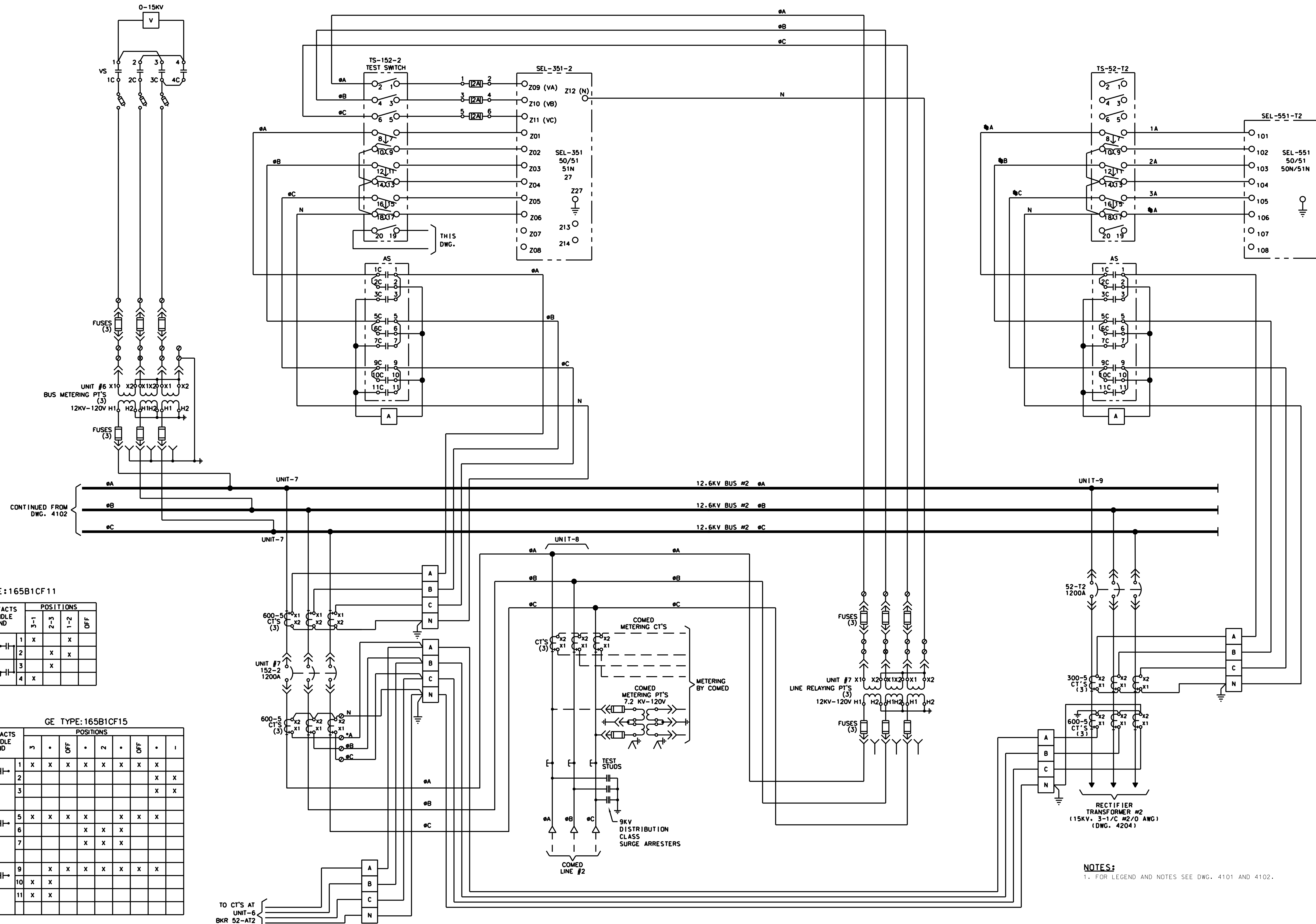
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DESIGNED: HS
 DRAWN: JMC
 CHECKED: FM
 METRA P.M.: R. CERANT
 DATE: JUNE 12, 2017



LOCATION NAME:
RIVERDALE SUBSTATION
 TITLE:
12.5KV AC THREE LINE DIAGRAM SHEET 2 OF 3

CAD FILE NUMBER: SS-17.5-4102.DGN
 SCALE: NTS
 DISTRICT: MED
 PROJECT NO. GW4254-57102002
 SHEET NO. SS-17.5-4102
 MILE POST NO. 17.5



GE TYPE: 165B1CF11

CONTACTS HANDLE END	POSITIONS			
	3-1	2-3	1-2	DF
1	X		X	
2		X		X
3			X	
4	X			

GE TYPE: 165B1CF15

CONTACTS HANDLE END	POSITIONS							
	3	•	OFF	•	2	•	OFF	•
1	X	X	X	X	X	X	X	X
2								X
3								X
5	X	X	X	X	X	X	X	X
6				X	X	X		
7				X	X	X		
9		X	X	X	X	X	X	X
10	X	X						
11	X	X						

NOTES:
1. FOR LEGEND AND NOTES SEE DWG. 4101 AND 4102.

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REV	DATE	BY	APP	DESCRIPTION
0	07-28-2017	HS	HS	ISSUED FOR BID

CONSULTANT SEAL & SIGNATURE



CONSULTANT



DESIGNED: HS

DRAWN: JMC

CHECKED: FM

METRA P.M.: R. CERANT

DATE: JUNE 12, 2017



LOCATION NAME:
OVERSEAS SUBSTATION

TITLE:

12.5KV AC THREE LINE DIAGRAM
SHEET 3 OF 3

CAD FILE NUMBER: SS-17.9-4103.DGN

SCALE: NTS

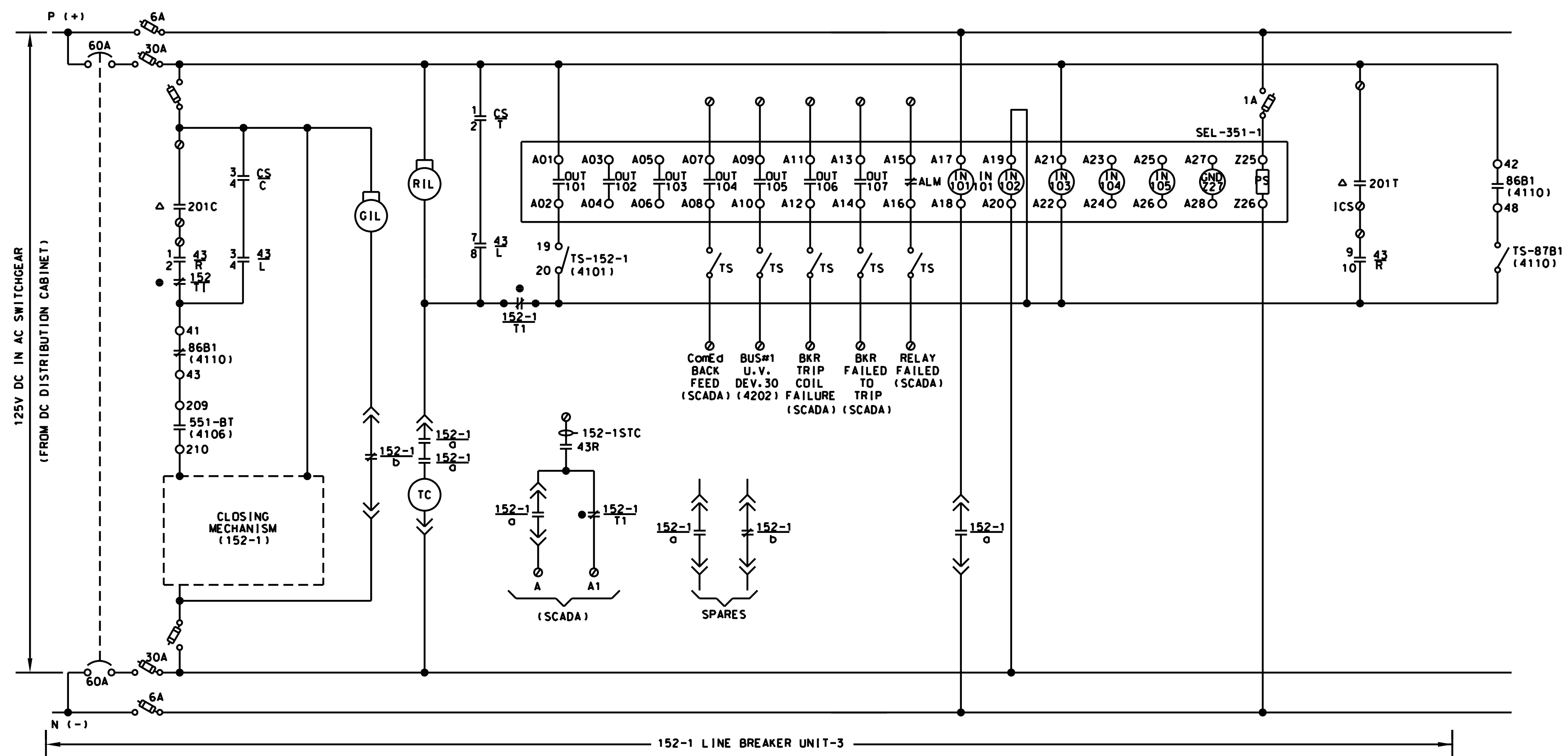
DISTRICT: MED

PROJECT NO. GW4254-57102002

SHEET NO.

SS-17.5-4103

MILE POST NO. 17.5



CONTROL-SWITCH DEVICE-CS

CONTACTS	POSITION		
	TRIP	OFF AFTER TRIP	CLOSE
1-2	T	X	
3-4	C		X

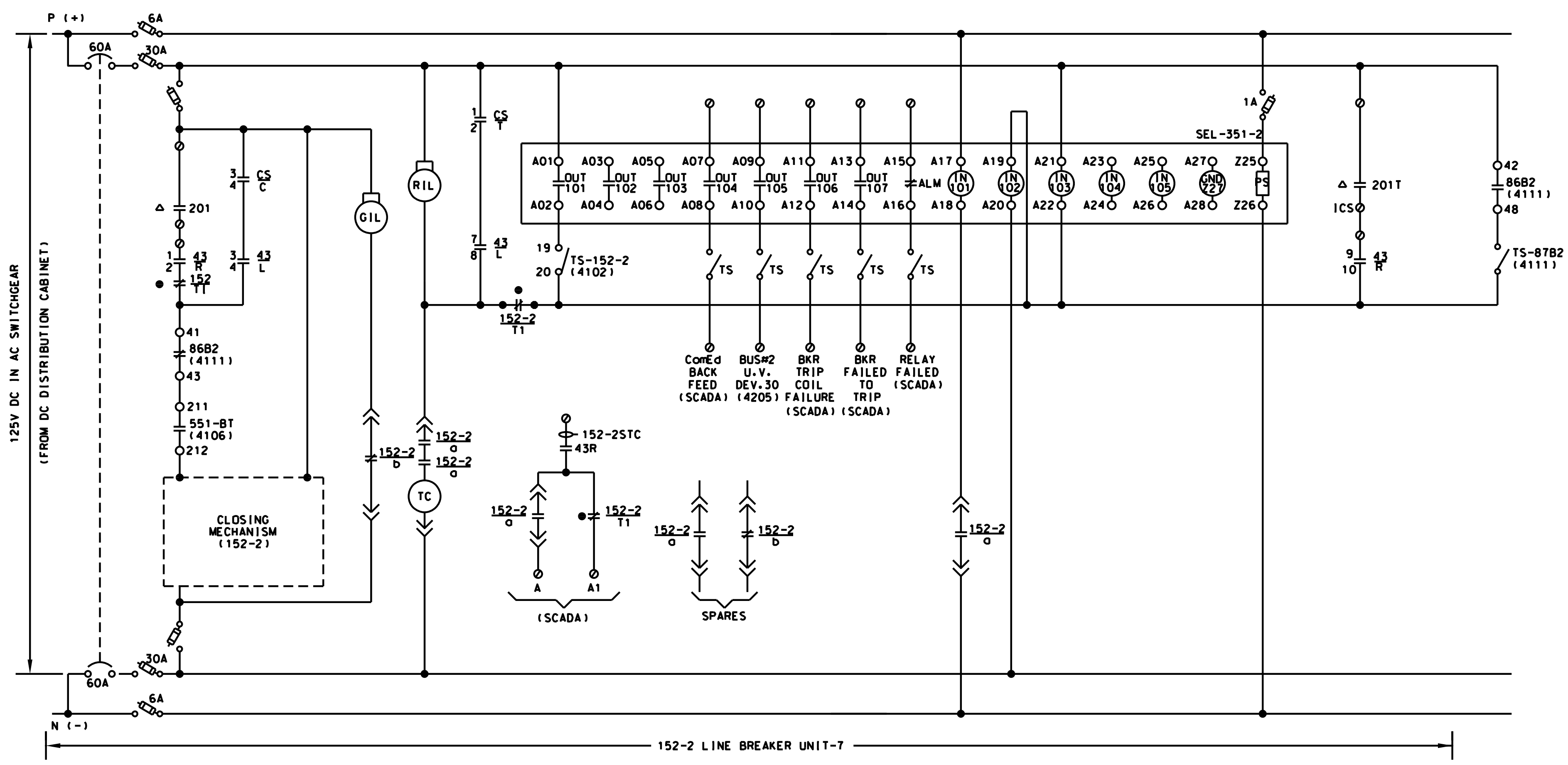
SPRING RETURN TO "OFF"

SELECTOR SWITCH DEVICE-43

CONTACTS	POSITION	
	REMOTE	LOCAL
1-2	R	X
3-4	L	X
5-6	R	X
7-8	L	X
9-10	R	X
11-12	L	X

NON-SPRING RETURN.
REMOTE POSITION AT 12 O' CLOCK.
LOCAL POSITION CLOCKWISE WHEN FACING FRONT OF SWITCH

LEGEND:
 ▲-LOCATED IN SCADA RTU CABINET
 ●-CLOSED ONLY WITH BREAKER IN CONNECTED POSITION
 ▲-OPEN ONLY WITH BREAKER IN CONNECTED POSITION
 ○-TERMINAL BLOCK



NOTES:
 1. ALL EQUIPMENT IS LOCATED IN 15KV SWGR. UNLESS OTHERWISE NOTED.
 2. NUMBER IN PARENTHESIS REFERS TO A DRAWING NUMBER.

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REV	DATE	BY	APP	DESCRIPTION
0	07-28-2017	HS	HS	ISSUED FOR BID

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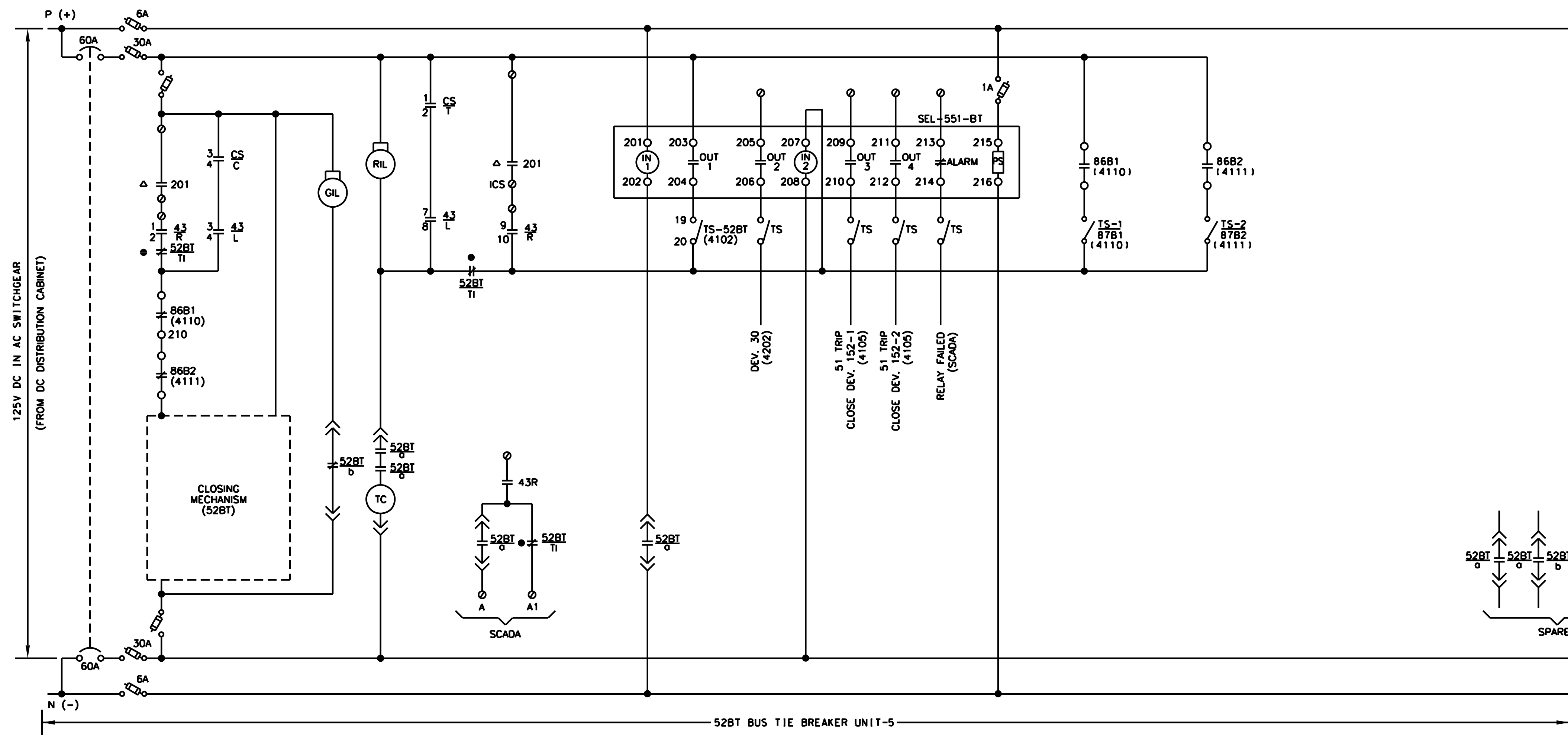


DESIGNED: HS
 DRAWN: JMC
 CHECKED: FM
 METRA P.M.: R. CERANT
 DATE: JUNE 12, 2017



LOCATION NAME:
RIVERDALE SUBSTATION
 TITLE:
**12.5KV AC SCHEMATIC DIAGRAM
 INC. LINE BKRS. 152-1 & 152-2**

CAD FILE NUMBER: SS-17.5-4105.DGN
 SCALE: NTS
 PROJECT NO. GW4254-57102002
 MILE POST NO. 17.5
 DISTRICT: MED
 SHEET NO. **SS-17.5-4105**



CONTROL-SWITCH DEVICE-CS

CONTACTS	POSITION		
	TRIP	OFF AFTER TRIP	CLOSE
1-2	T	X	
3-4	C		X

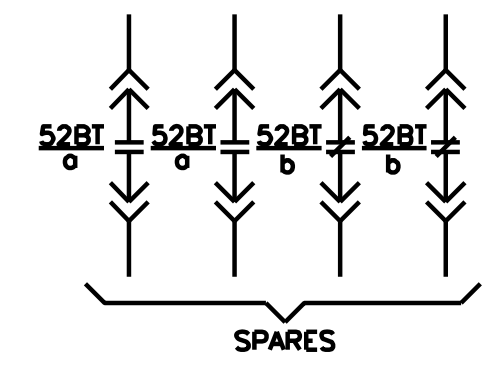
SPRING RETURN TO "OFF"

SELECTOR SWITCH DEVICE-43

CONTACTS	POSITION	
	REMOTE	LOCAL
1-2	R	X
3-4	L	X
5-6	R	X
7-8	L	X
9-10	R	X
11-12	L	X

NON-SPRING RETURN.
REMOTE POSITION AT 12 O' CLOCK.
LOCAL POSITION CLOCKWISE WHEN FACING FRONT OF SWITCH

LEGEND:
 ▲-LOCATED IN SCADA RTU CABINET
 ●-CLOSED ONLY WITH BREAKER IN CONNECTED POSITION
 ▲-OPEN ONLY WITH BREAKER IN CONNECTED POSITION
 ○-TERMINAL BLOCK



NOTES:
 1. ALL EQUIPMENT IS LOCATED IN 15KV SWGR. UNLESS OTHERWISE NOTED.
 2. NUMBER IN PARENTHESIS REFERS TO A DRAWING NUMBER.

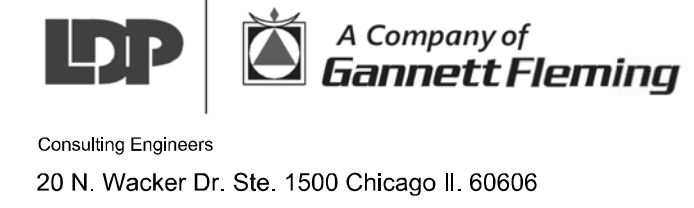
PRINTED ON: SDATES

REV	DATE	BY	APP	DESCRIPTION
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CONSULTANT SEAL & SIGNATURE



CONSULTANT



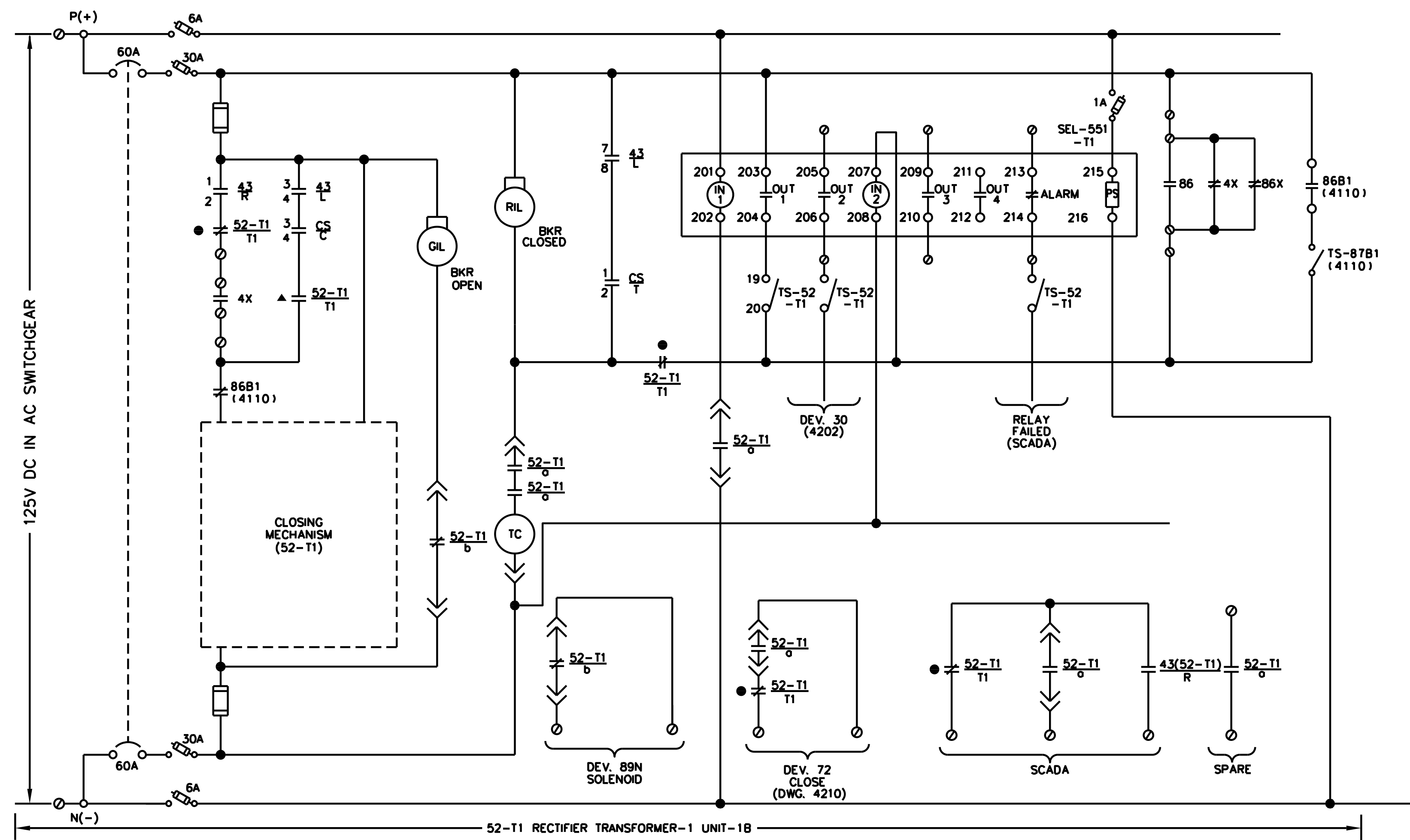
DESIGNED: HS
 DRAWN: JMC
 CHECKED: FM
 METRA P.M.: R. CERANT
 DATE: JUNE 12, 2017



LOCATION NAME:
RIVERDALE SUBSTATION

TITLE:
**12.5KV AC SCHEMATIC DIAGRAM
 BUS TIE BKR. 52BT**

CAD FILE NUMBER: SS-17.5-4106.DGN	
SCALE: NTS	DISTRICT: MED
PROJECT NO. GW4254-57102002	SHEET NO. SS-17.5-4106
MILE POST NO. 17.5	



CONTROL-SWITCH DEVICE-CS

CONTACTS	POSITION		
	TRIP	OFF TRIP	AFTER CLOSE
1-2	T	X	
3-4	C		X

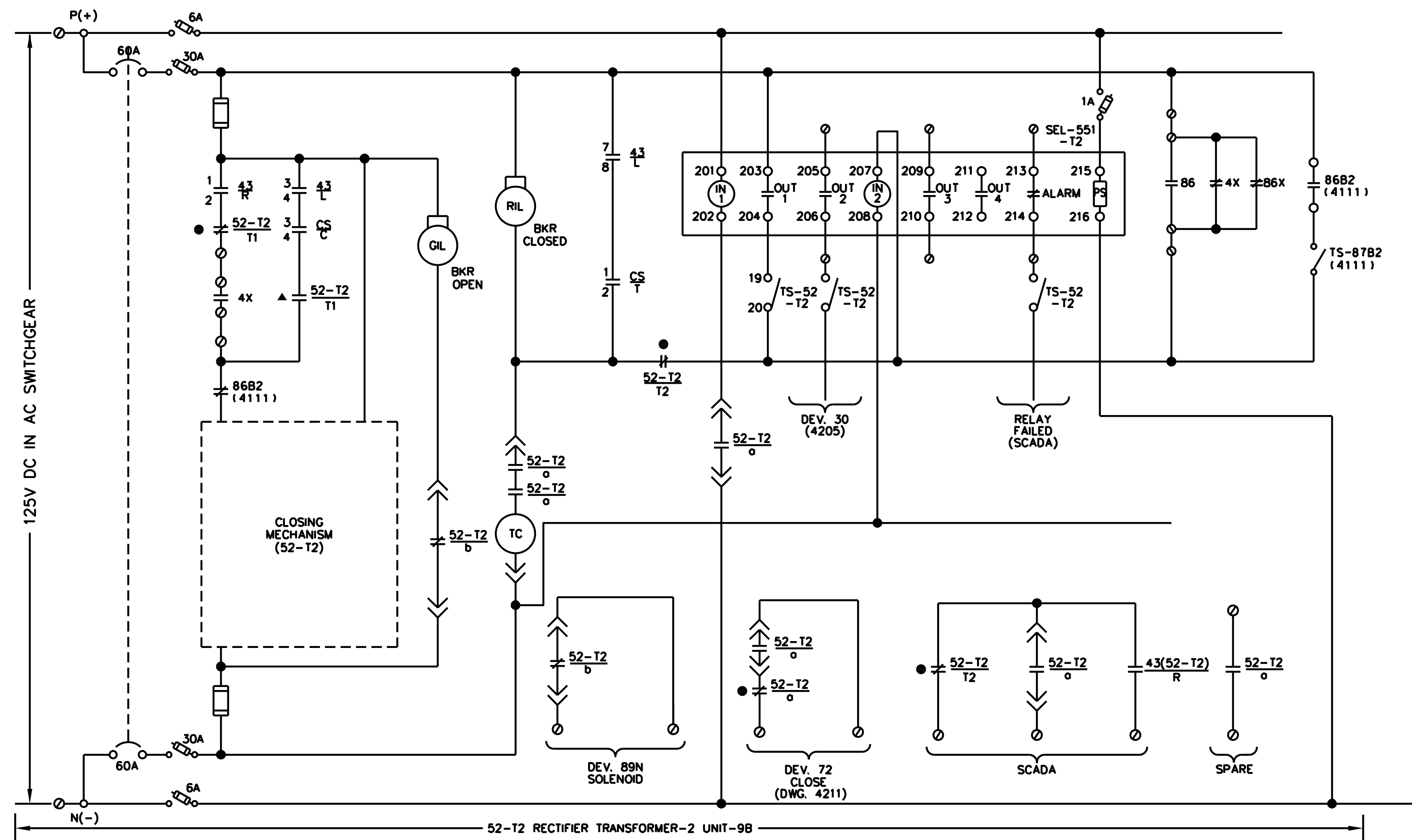
SPRING RETURN TO "OFF"

SELECTOR SWITCH DEVICE-43

CONTACTS	POSITION	
	REMOTE	LOCAL
1-2	R	X
3-4	L	X
5-6	R	X
7-8	L	X
9-10	R	X
11-12	L	X

NON-SPRING RETURN.
REMOTE POSITION AT 12 O' CLOCK.
LOCAL POSITION CLOCKWISE WHEN
FACING FRONT OF SWITCH

LEGEND:
▲-LOCATED IN SCADA RTU CABINET
●-CLOSED ONLY WITH BREAKER IN CONNECTED POSITION
▲-OPEN ONLY WITH BREAKER IN CONNECTED POSITION
○-TERMINAL BLOCK



NOTES:
1. ALL EQUIPMENT IS LOCATED IN 15KV SWGR.
UNLESS OTHERWISE NOTED.
2. NUMBER IN PARENTHESIS REFERS TO A DRAWING NUMBER.

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REV	DATE	BY	APP	DESCRIPTION
0	07-28-2017	HS	HS	ISSUED FOR BID



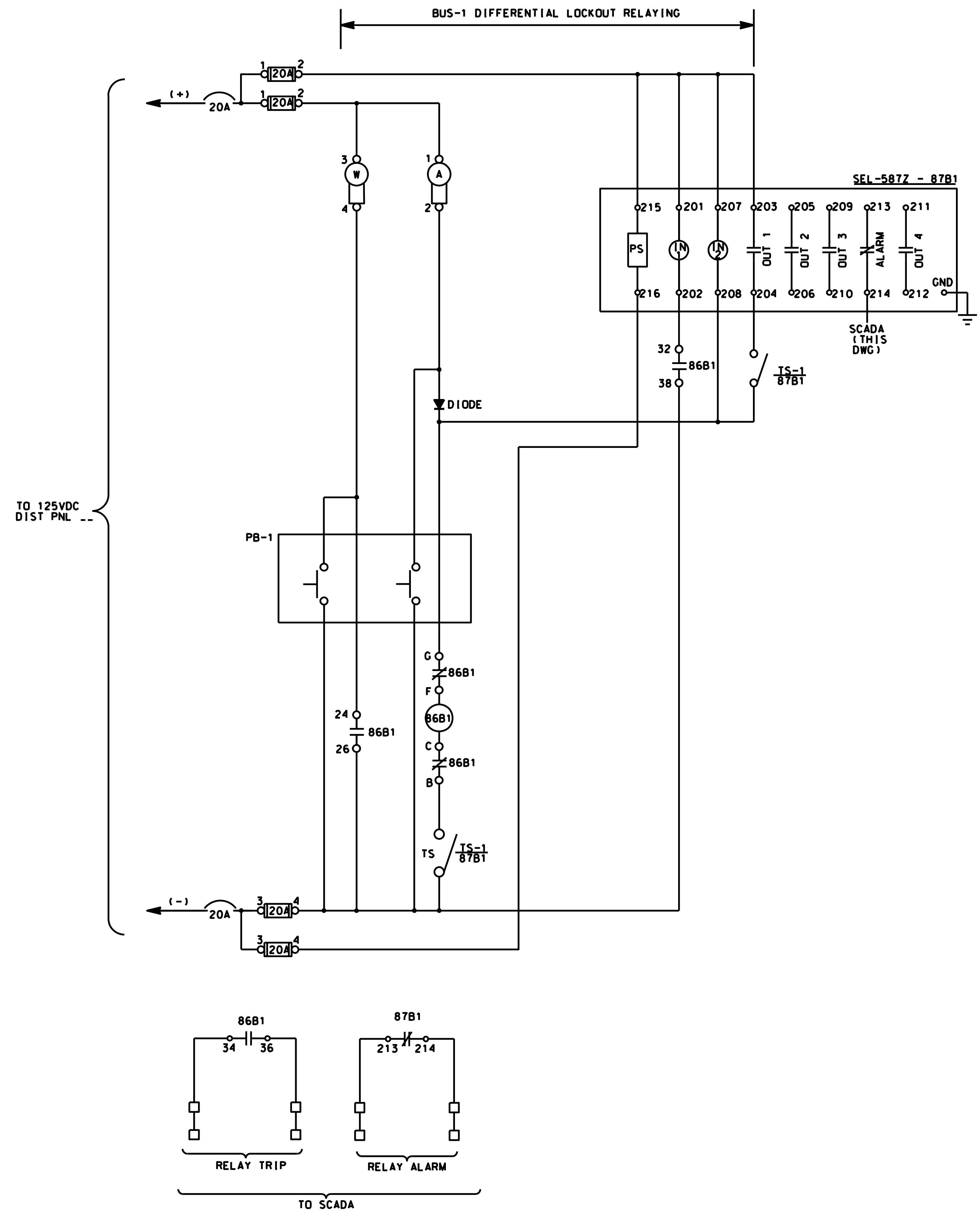
CONSULTANT SEAL & SIGNATURE
CONSULTANT
IDP
A Company of
Gannett Fleming
Consulting Engineers
20 N. Wacker Dr. Ste. 1500 Chicago IL 60606

DESIGNED: HS
DRAWN: JMC
CHECKED: FM
METRA P.M.: R. CERANT
DATE: JUNE 12, 2017

Metra
ENGINEERING DEPARTMENT
547 W. JACKSON BOULEVARD
CHICAGO, ILLINOIS 60661

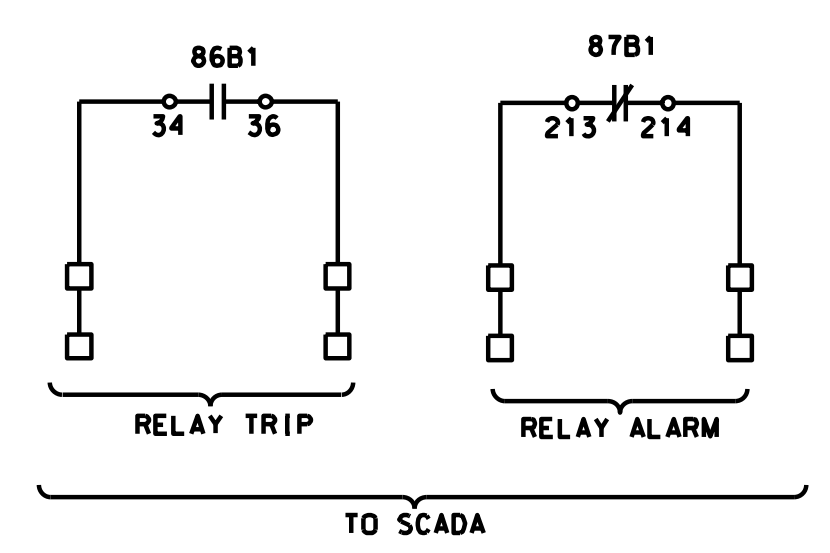
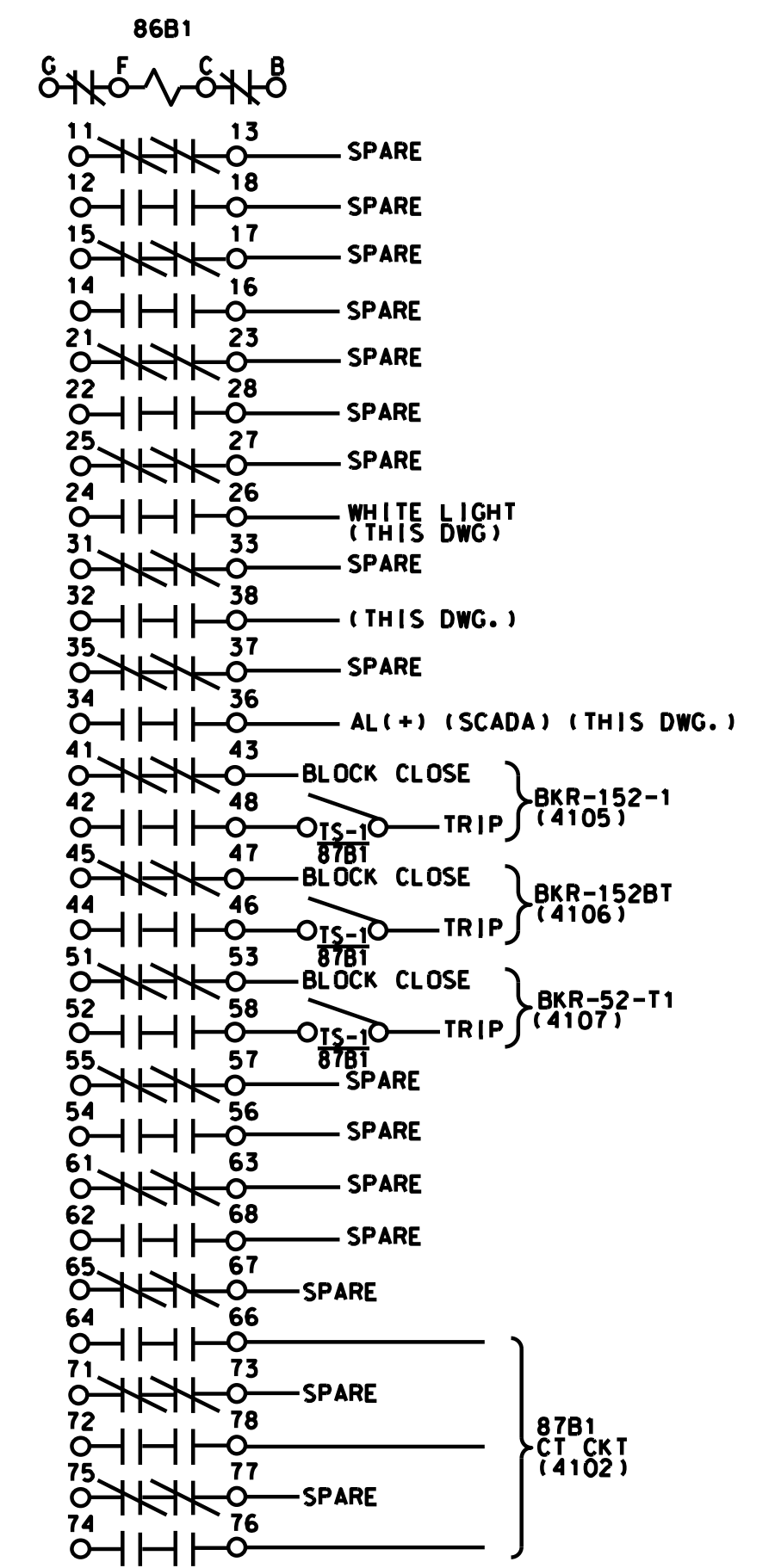
LOCATION NAME:
RIVERDALE SUBSTATION
TITLE:
**12.5KV AC SCHEMATIC DIAGRAM
RECT. TRANSF. BKR. 52-T1 & 52-T2**

CAD FILE NUMBER: SS-17.5-4107.DGN
SCALE: NTS
DISTRICT: MED
PROJECT NO. GW4254-57102002
SHEET NO. **SS-17.5-4107**
MILE POST NO. 17.5



LOCKOUT RELAY 86B1
X - DENOTES CLOSED IN POSITION

DECK	CONTACTS	POSITION	
		IN	OUT
1	11-0-1-013	X	
	12-0-1-018	X	
	15-0-1-017	X	
	14-0-1-016	X	
2	21-0-1-023	X	
	22-0-1-028	X	
	25-0-1-027	X	
	24-0-1-026	X	
3	31-0-1-033	X	
	32-0-1-038	X	
	35-0-1-037	X	
	34-0-1-036	X	
4	41-0-1-043	X	
	42-0-1-048	X	
	45-0-1-047	X	
	44-0-1-046	X	
5	51-0-1-053	X	
	52-0-1-058	X	
	55-0-1-057	X	
	54-0-1-056	X	
6	61-0-1-063	X	
	62-0-1-068	X	
	65-0-1-067	X	
	64-0-1-066	X	
7	71-0-1-073	X	
	72-0-1-078	X	
	75-0-1-077	X	
	74-0-1-076	X	



LEGEND:
 87B1 BUS-1 DIFFERENTIAL RELAY
 86B1 BUS-1 LOCKOUT RELAY
 TS-1 TEST SWITCH FOR BUS DIFFERENTIAL AND LOCKOUT RELAY FOR BUS-1
 PB MOMENTARY TEST PUSHBUTTON

NOTES:
 1. NUMBER IN PARENTHESIS REFERS TO A DRAWING NUMBER

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REV	DATE	BY	APP	DESCRIPTION
0	07-28-2017	HS	HS	ISSUED FOR BID

REV	DATE	BY	APP	DESCRIPTION

CONSULTANT SEAL & SIGNATURE

CONSULTANT

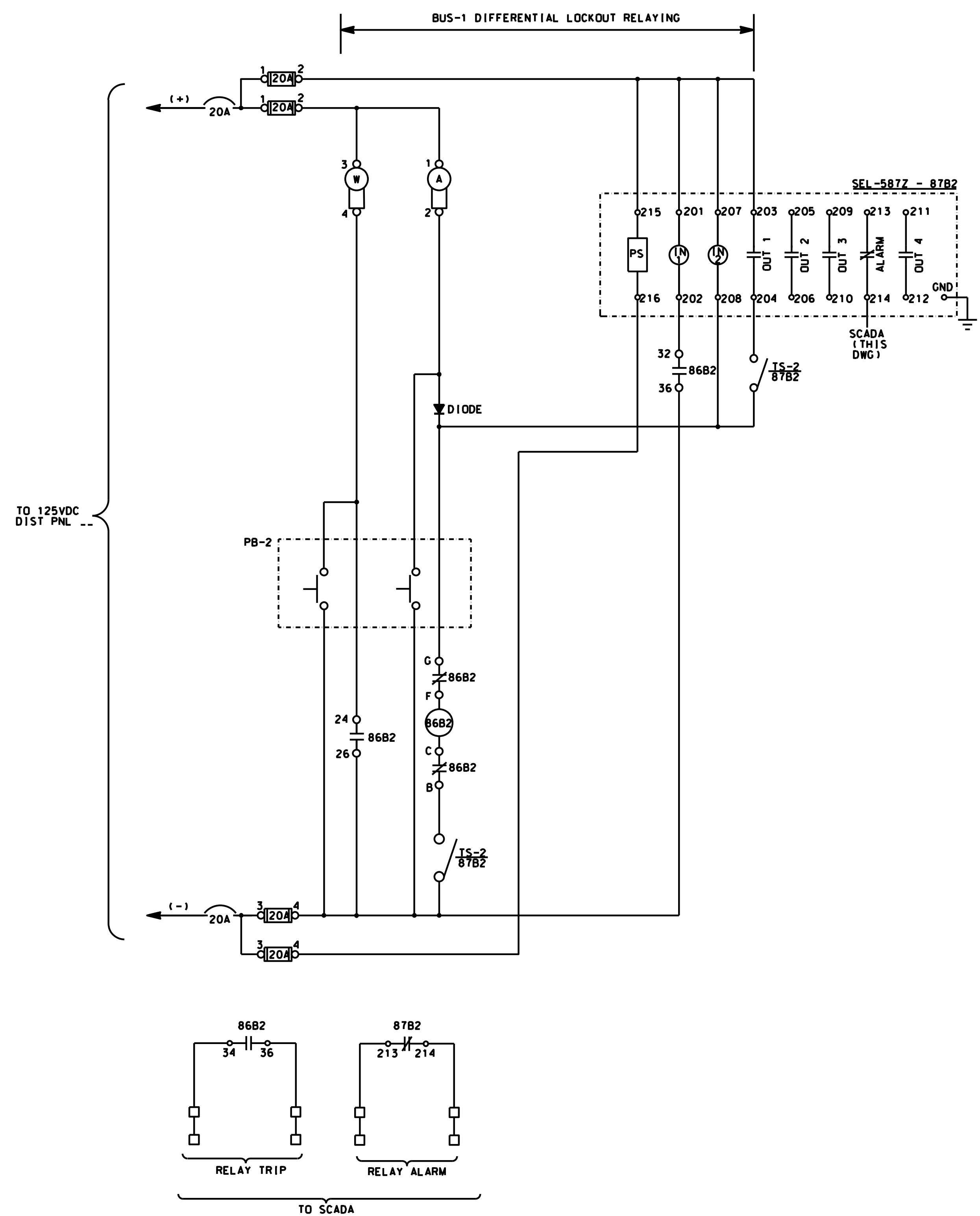
Consulting Engineers
 20 N. Wacker Dr. Ste. 1500 Chicago IL 60606

DESIGNED: HS
DRAWN: JMC
CHECKED: FM
METRA P.M.: R. CERANT
DATE: JUNE 12, 2017

ENGINEERING DEPARTMENT
 547 W. JACKSON BOULEVARD
 CHICAGO, ILLINOIS 60661

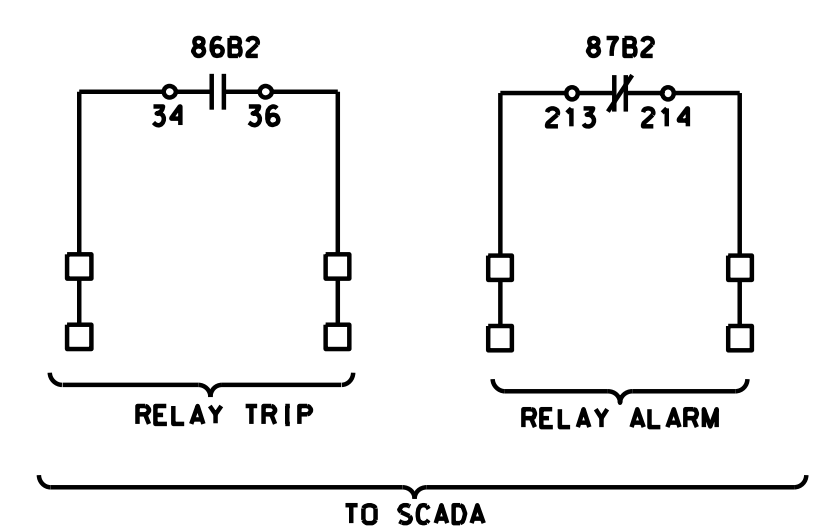
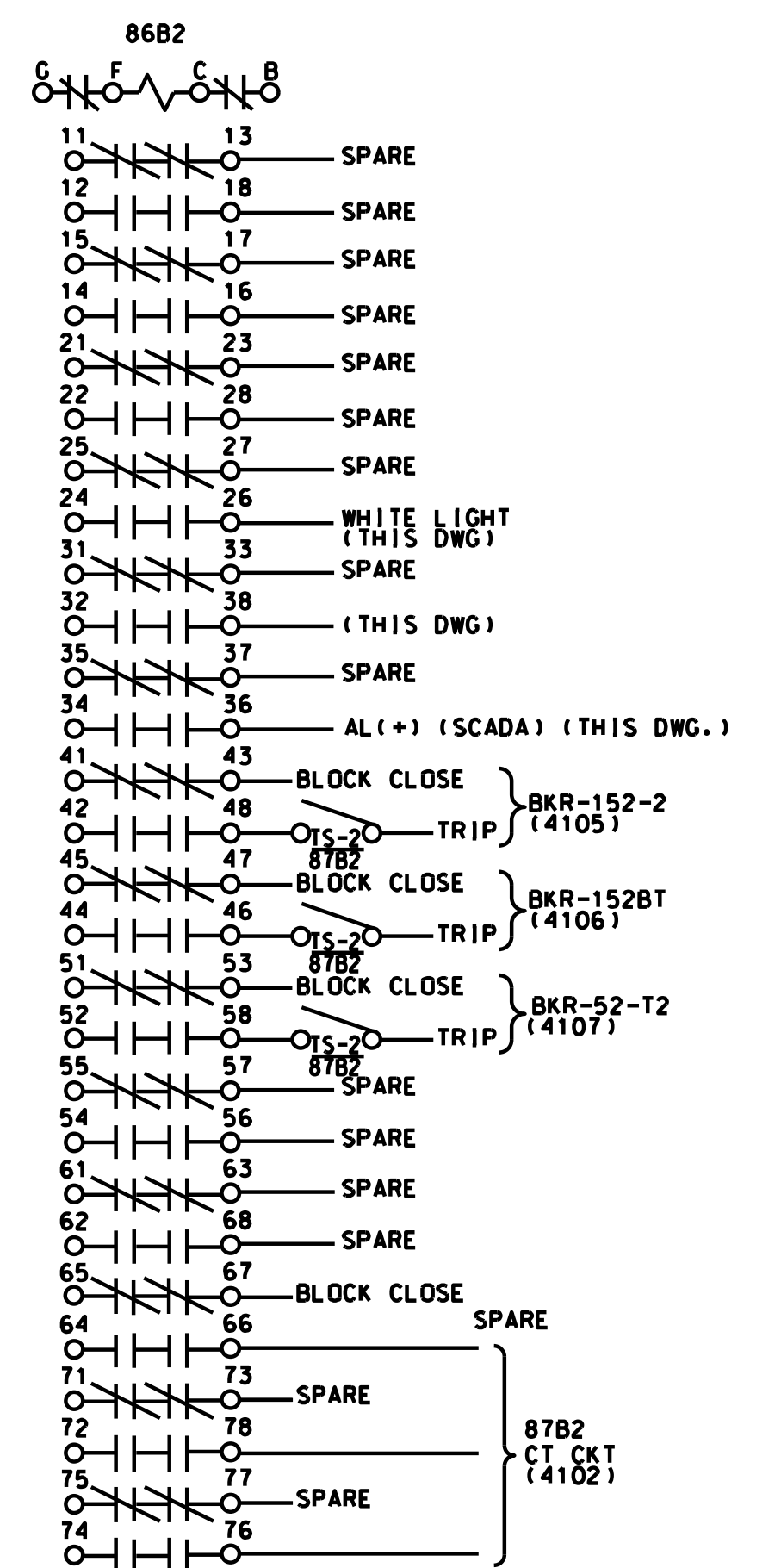
LOCATION NAME: RIVERDALE SUBSTATION	TITLE: 12.5KV AC SCHEMATIC DIAGRAM BUS-1 DIFFERENTIAL LOCKOUT
SCALE: NTS	
PROJECT NO. GW4254-57102002	
MILE POST NO. 17.5	DISTRICT: MED
SHEET NO. SS-17.5-4110	

CAD FILE NUMBER: SS-17.5-4110.DGN	
DISTRICT: MED	SHEET NO. SS-17.5-4110



LOCKOUT RELAY 86B2
X - DENOTES CLOSED IN POSITION

DECK	CONTACTS	POSITION
1	110-1-1-013	X
1	12-1-1-018	X
1	15-1-1-017	X
1	14-1-1-016	X
2	210-1-1-023	X
2	22-1-1-028	X
2	24-1-1-026	X
2	25-1-1-027	X
3	310-1-1-033	X
3	32-1-1-038	X
3	35-1-1-037	X
3	34-1-1-036	X
4	410-1-1-043	X
4	42-1-1-048	X
4	45-1-1-047	X
4	44-1-1-046	X
5	510-1-1-053	X
5	52-1-1-058	X
5	54-1-1-056	X
6	610-1-1-063	X
6	62-1-1-068	X
6	65-1-1-067	X
6	64-1-1-066	X
7	710-1-1-073	X
7	72-1-1-078	X
7	75-1-1-077	X
7	74-1-1-076	X



LEGEND:

- 87B2 BUS-2-DIFFERENTIAL RELAY
- 86B2 BUS-2-LOCKOUT RELAY
- TS-2 TEST SWITCH FOR BUS DIFFERENTIAL AND LOCKOUT RELAY FOR BUS-2
- PB MOMENTARY TEST PUSHBUTTON

NOTES:

1. NUMBER IN PARENTHESIS REFERS TO A DRAWING NUMBER

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REV	DATE	BY	APP	DESCRIPTION
0	07-28-2017	HS	HS	ISSUED FOR BID

REV	DATE	BY	APP	DESCRIPTION

CONSULTANT SEAL & SIGNATURE

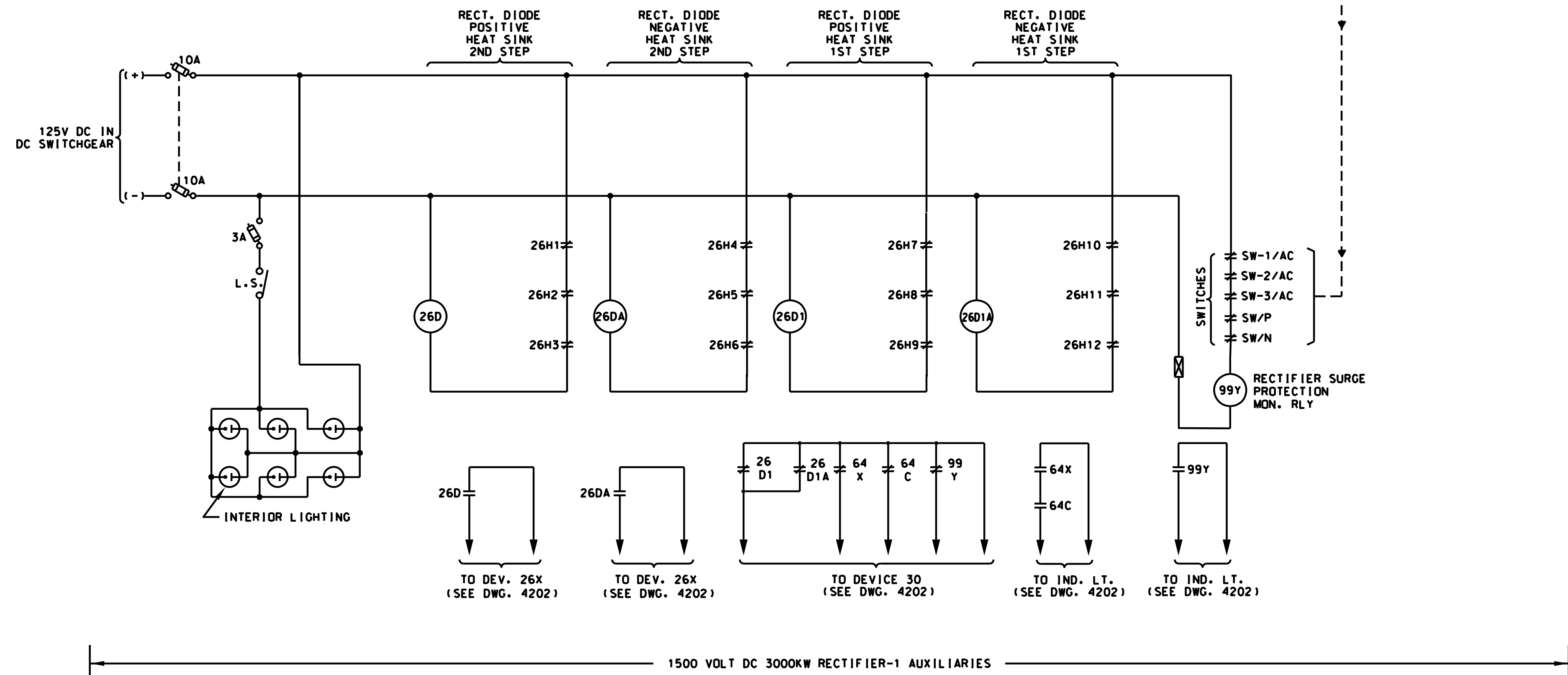
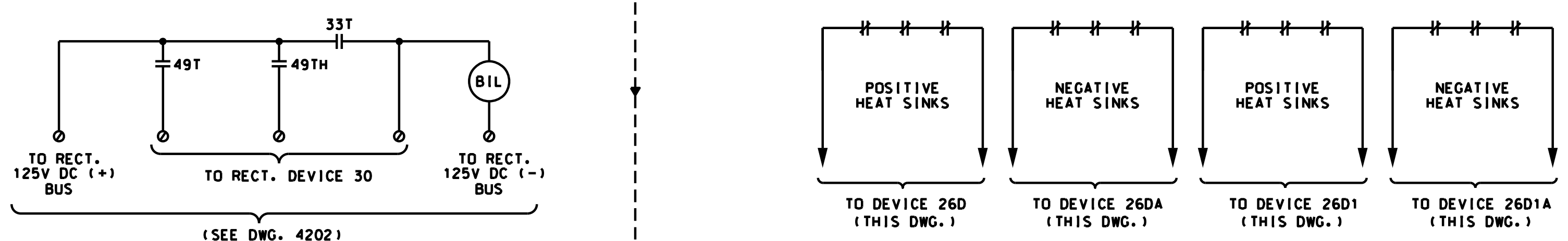
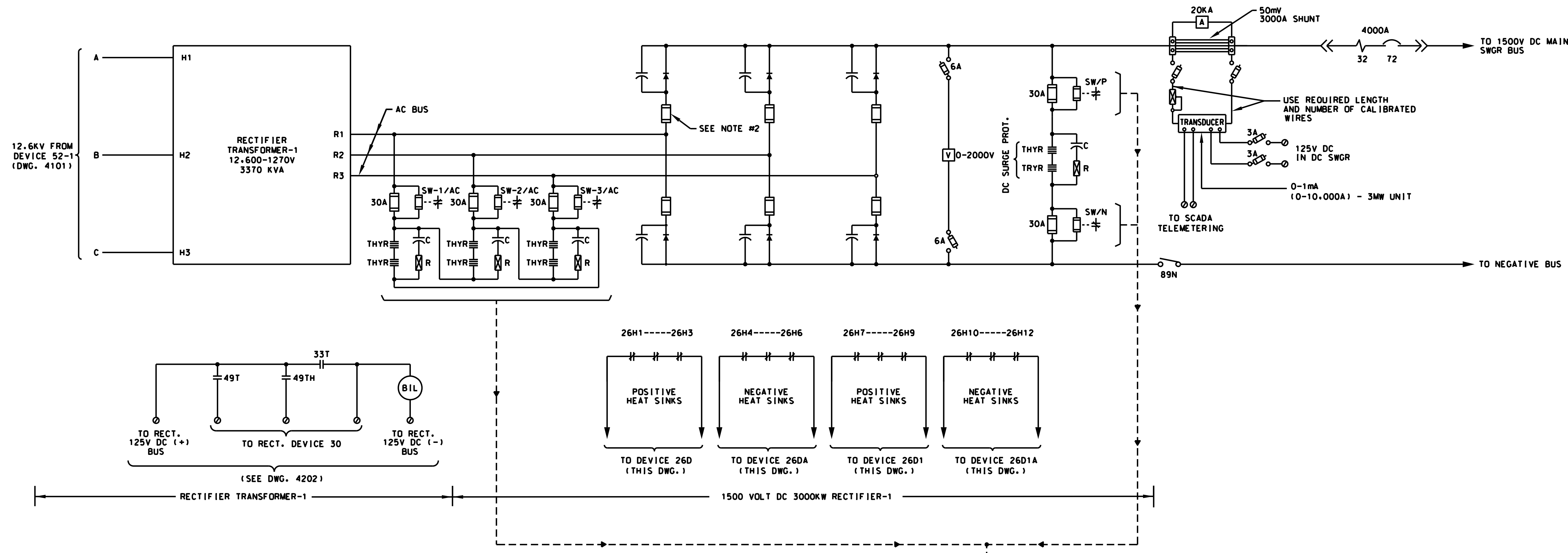
CONSULTANT

Consulting Engineers
20 N. Wacker Dr. Ste. 1500 Chicago IL 60606

DESIGNED: HS
DRAWN: JMC
CHECKED: FM
METRA P.M.: R. CERANT
DATE: JUNE 12, 2017

ENGINEERING DEPARTMENT
547 W. JACKSON BOULEVARD
CHICAGO, ILLINOIS 60661

LOCATION NAME: RIVERDALE SUBSTATION	CAD FILE NUMBER: SS-17.5-4111.DGN
TITLE: 12.5KV AC SCHEMATIC DIAGRAM BUS-2 DIFFERENTIAL LOCKOUT	SCALE: NTS
	DISTRICT: MED
	PROJECT NO. GW4254-57102002
	MILE POST NO. 17.5
	SHEET NO. SS-17.5-4111



NOTES:

1. DIODE THERMAL DEVICES CONNECTED TOGETHER MUST BE ON HEAT SINKS OF THE SAME POLARITY UNDER ALL CONDITIONS.
2. PROVIDE TRIGGER TARGET TYPE DIODE FUSES.
3. CONTACT WILL CLOSE IN NORMAL CONDITION & WILL OPEN IN FAULT CONDITION.

SYMBOLS:

- TERMINAL BLOCK

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0	07-28-2017	HS	HS	ISSUED FOR BID					

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CONSULTANT



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Consulting Engineers
20 N. Wacker Dr. Ste. 1500 Chicago IL 60606

DESIGNED: HS
DRAWN: JMC
CHECKED: FM
METRA P.M.: R. CERANT
DATE: JUNE 12, 2017



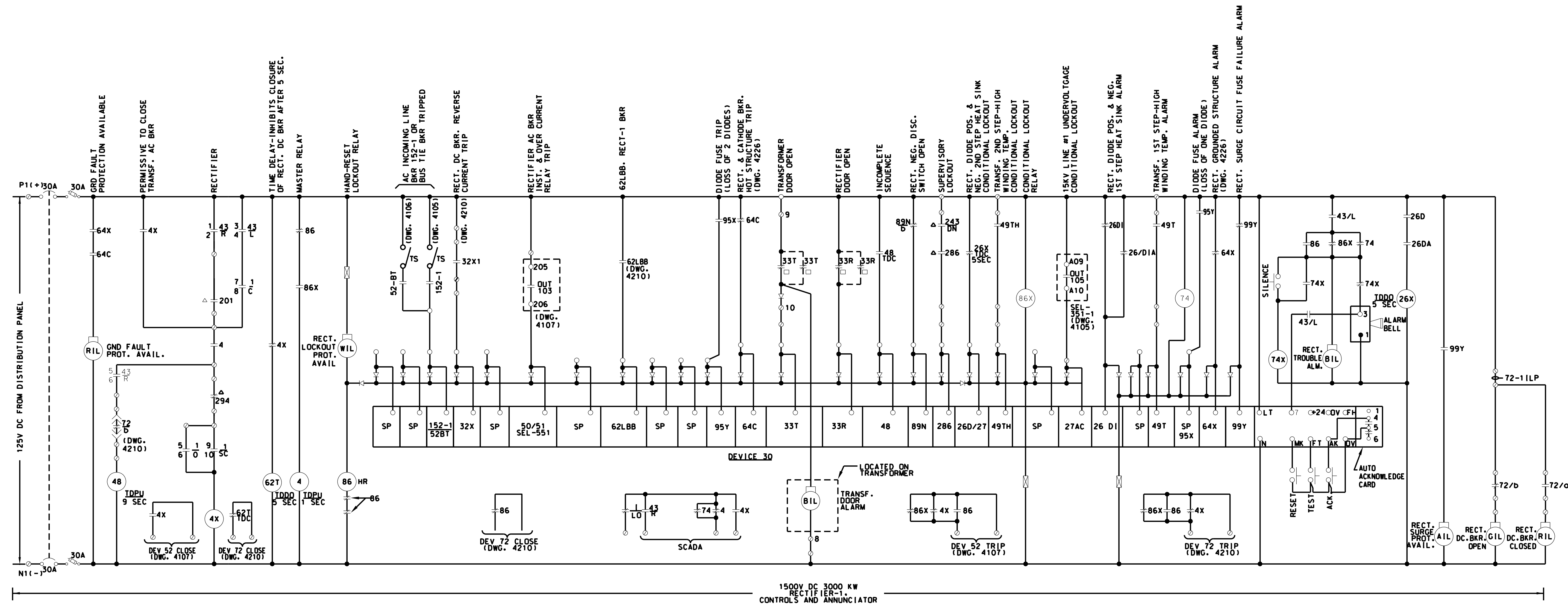
LOCATION NAME:
RIVERDALE SUBSTATION

TITLE:
**1500V DC SCHEMATIC DIAGRAM
RECTIFIER-1 POWER & AUXILIARIES**

CAD FILE NUMBER: SS-17.5-4201.DGN

SCALE: NTS
PROJECT NO. GW4254-57102002
MILE POST NO. 17.5

DISTRICT: MED
SHEET NO. **SS-17.5-4201**



SYMBOLS:

- △ LOCATED IN SCADA RTU CABINET
- CLOSED ONLY WITH BREAKER IN CONNECTED POS.
- ▲ OPEN ONLY WITH BREAKER IN CONNECTED POS.
- ⬢ TERMINAL BLOCK
- RTU-INDICATES SCADA REMOTE TERMINAL UNIT.

**MASTER CONTROL SWITCH
DEVICE-1**

CONTACTS	POSITION			
	PULL OUT	TRIP	OFF AFTER TRIP	CLOSE
1-2	LO	X	X	X
3-4	T	X		
5-6	O		X	X
7-8	C			X
9-10	SC		X	X

SPRING RETURN TO "OFF"

**SELECTOR SWITCH
DEVICE-43**

CONTACTS	POSITION	
	REMOTE	LOCAL
1-2	R	X
3-4	L	X
5-6	R	X
7-8	L	X
9-10	R	X
11-12	L	X

NON-SPRING RETURN.
REMOTE POSITION AT 12 O' CLOCK.
LOCAL POSITION CLOCKWISE WHEN FACING FRONT OF SWITCH.

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REV	DATE	BY	APP	DESCRIPTION
0	07-28-2017	HS	HS	ISSUED FOR BID

REV	DATE	BY	APP	DESCRIPTION

CONSULTANT SEAL & SIGNATURE

CONSULTANT

IDP A Company of **Gannett Fleming**

Consulting Engineers
20 N. Wacker Dr. Ste. 1500 Chicago IL 60606

DESIGNED: HS
DRAWN: JMC
CHECKED: FM
METRA P.M.: R. CERANT
DATE: JUNE 12, 2017

Metra

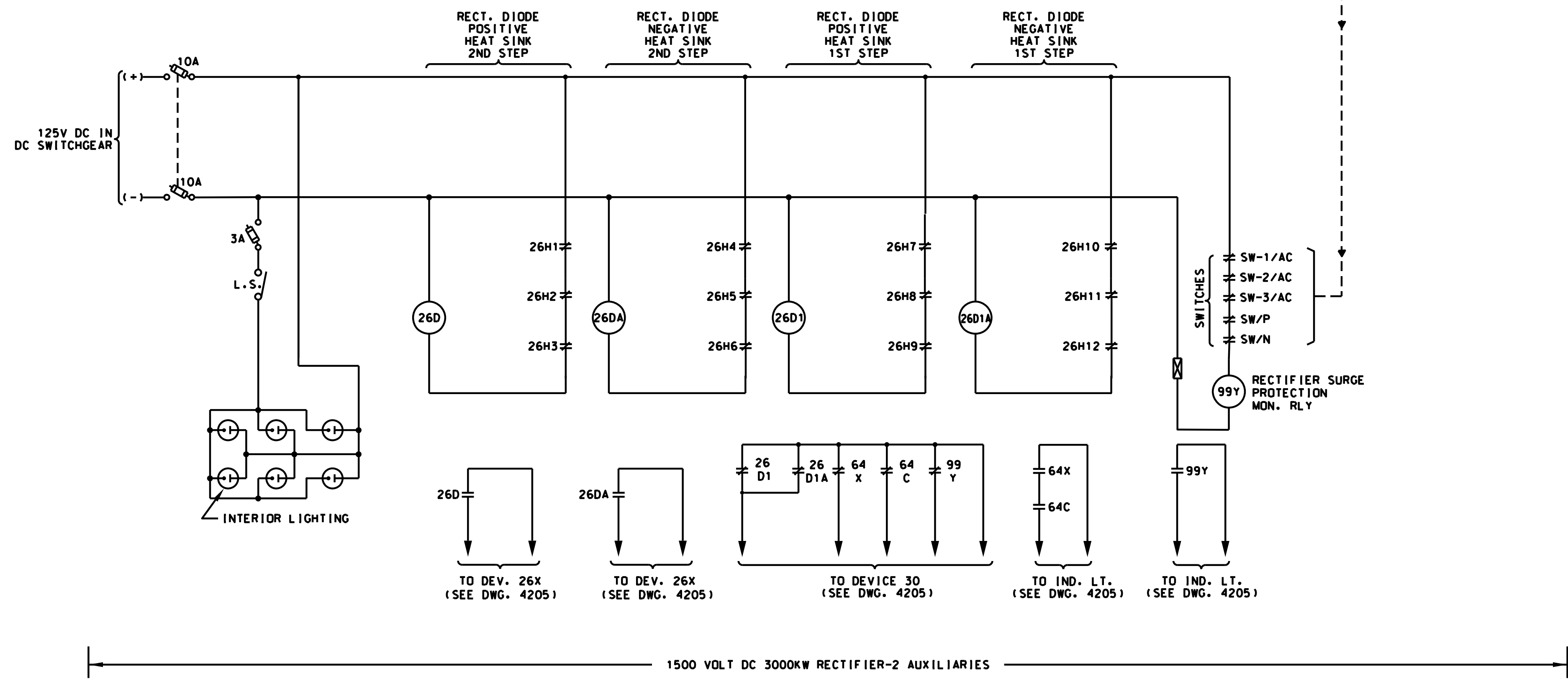
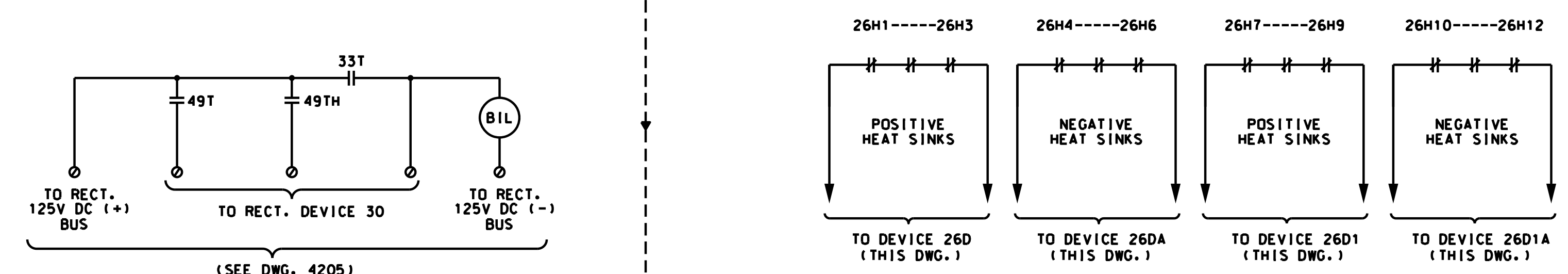
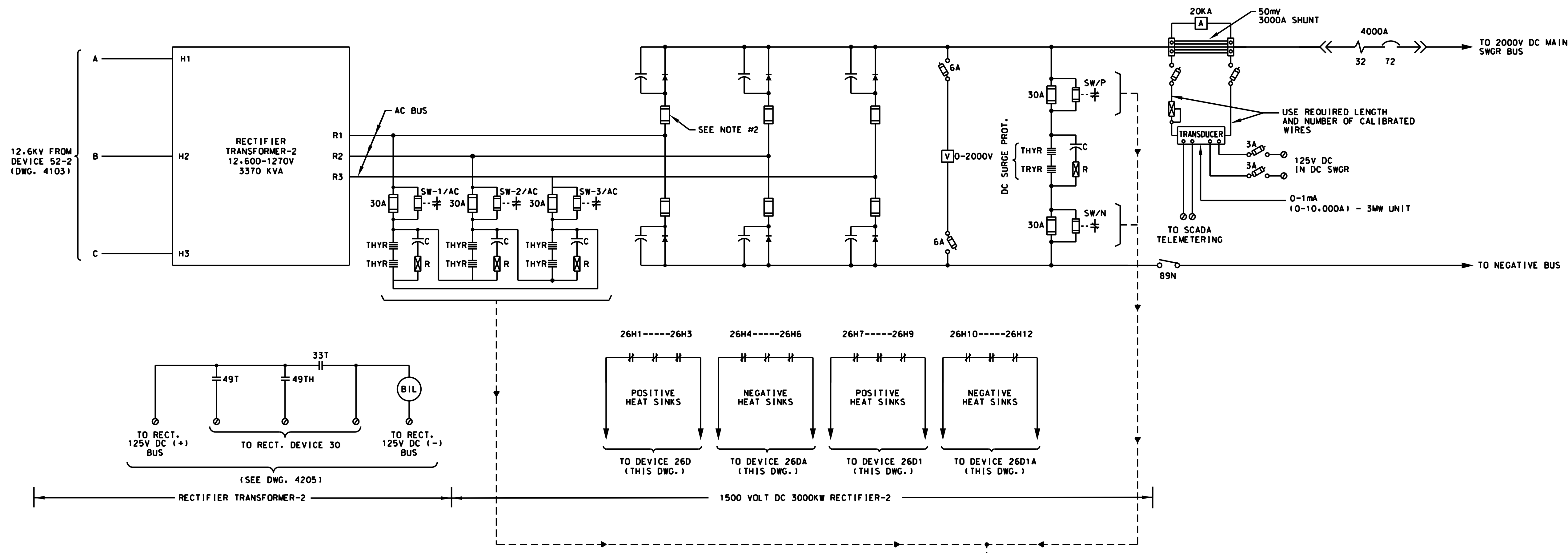
ENGINEERING DEPARTMENT
547 W. JACKSON BOULEVARD
CHICAGO, ILLINOIS 60661

LOCATION NAME:
RIVERDALE SUBSTATION

TITLE:
**1500V DC SCHEMATIC DIAGRAM
RECTIFIER-1 CONTROLS & ANNUNCIATOR**

CAD FILE NUMBER: SS-17.5-4202.DGN

SCALE: NTS	DISTRICT: MED
PROJECT NO. GW4254-57102002	SHEET NO. SS-17.5-4202
MILE POST NO. 17.5	



NOTES:

1. DIODE THERMAL DEVICES CONNECTED TOGETHER MUST BE ON HEAT SINKS OF THE SAME POLARITY UNDER ALL CONDITIONS.
2. PROVIDE TRIGGER TARGET TYPE DIODE FUSES.
3. CONTACT WILL CLOSE IN NORMAL CONDITION & WILL OPEN IN FAULT CONDITION.

SYMBOLS:

- ⊙ TERMINAL BLOCK

PRINTED ON: SDATES

REV	DATE	BY	APP	DESCRIPTION
0	07-28-2017	HS	HS	ISSUED FOR BID

REV	DATE	BY	APP	DESCRIPTION

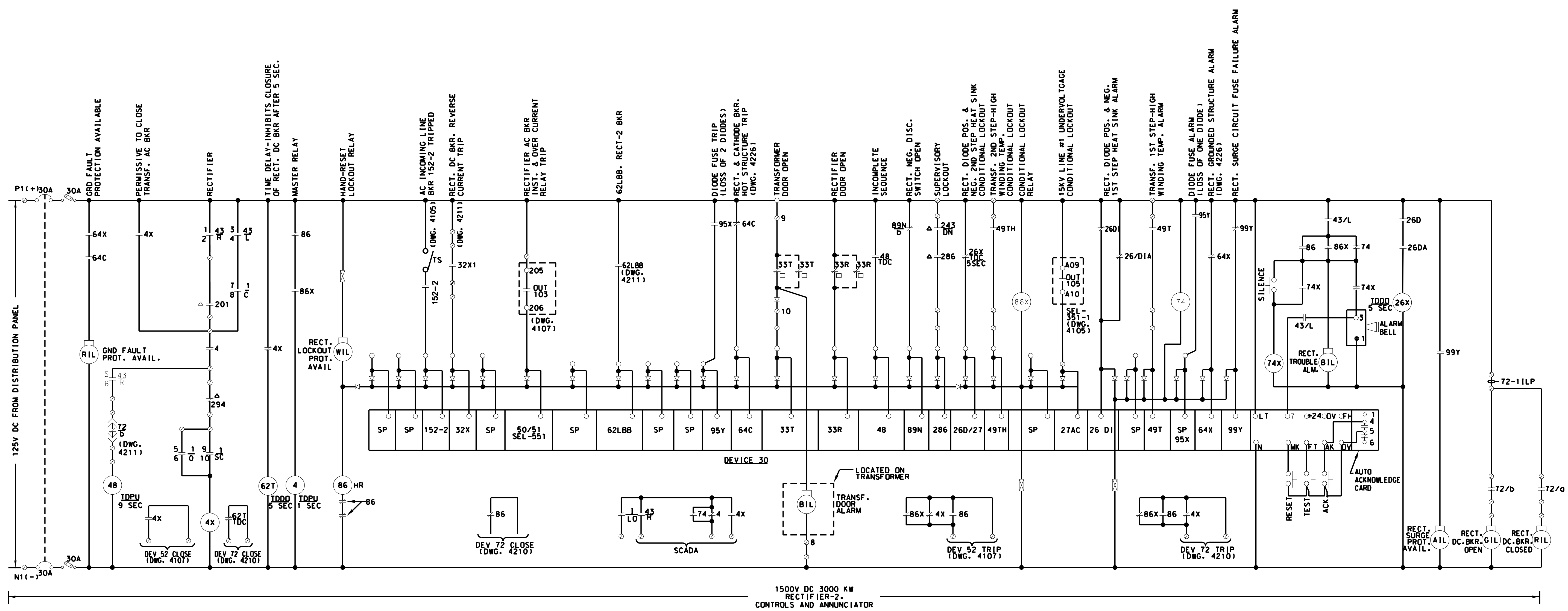
CONSULTANT SEAL & SIGNATURE

CONSULTANT

DESIGNED: HS
DRAWN: JMC
CHECKED: FM
METRA P.M.: R. CERANT
DATE: JUNE 12, 2017

LOCATION NAME: RIVERDALE SUBSTATION
TITLE: 1500V DC SCHEMATIC DIAGRAM RECTIFIER-2 POWER & AUXILIARIES

CAD FILE NUMBER: SS-17.5-4204.DGN	
SCALE: NTS	DISTRICT: MED
PROJECT NO. GW4254-57102002	SHEET NO. SS-17.5-4204
MILE POST NO. 17.5	



1500V DC 3000 KW
RECTIFIER-2
CONTROLS AND ANNUNCIATOR

SYMBOLS:

- △ LOCATED IN SCADA RTU CABINET
- CLOSED ONLY WITH BREAKER IN CONNECTED POS.
- ▲ OPEN ONLY WITH BREAKER IN CONNECTED POS.
- ⊙ TERMINAL BLOCK
- RTU-INDICATES SCADA REMOTE TERMINAL UNIT.

**MASTER CONTROL SWITCH
DEVICE-1**

CONTACTS	POSITION			
	PULL OUT	TRIP	OFF AFTER TRIP	CLOSE
1-2 LO	X	X	X	X
3-4 T	X			
5-6 O		X	X	
7-8 C				X
9-10 SC			X	X

SPRING RETURN TO "OFF"

**SELECTOR SWITCH
DEVICE-43**

CONTACTS	POSITION	
	REMOTE	LOCAL
1-2	R	X
3-4	L	X
5-6	R	X
7-8	L	X
9-10	R	X
11-12	L	X

NON-SPRING RETURN;
REMOTE POSITION AT 12 O' CLOCK.
LOCAL POSITION CLOCKWISE WHEN FACING FRONT OF SWITCH.

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REV	DATE	BY	APP	DESCRIPTION
0	07-28-2017	HS	HS	ISSUED FOR BID

CONSULTANT SEAL & SIGNATURE



CONSULTANT



DESIGNED: HS
DRAWN: JMC
CHECKED: FM
METRA P.M.: R. CERANT
DATE: JUNE 12, 2017



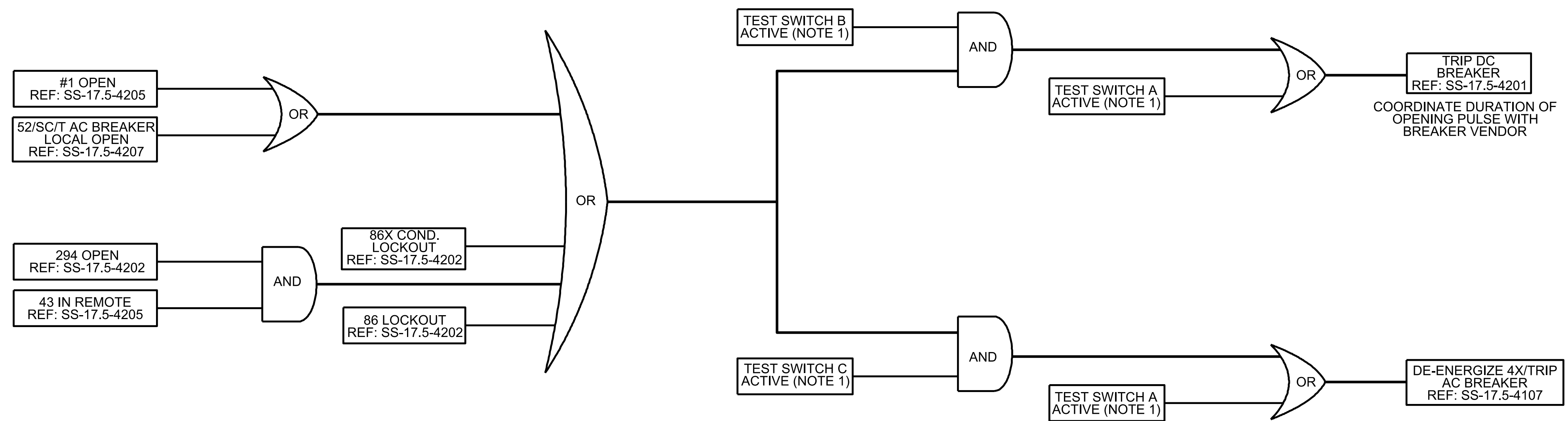
LOCATION NAME:
RIVERDALE SUBSTATION

**1500V DC SCHEMATIC DIAGRAM
RECTIFIER-2 CONTROLS & ANNUNCIATOR**

CAD FILE NUMBER: SS-17.5-4205.DGN

SCALE: NTS	DISTRICT: MED
PROJECT NO. GW4254-57102002	SHEET NO. SS-17.5-4205
MILE POST NO. 17.5	

AC BREAKER/CATHODE TRIP



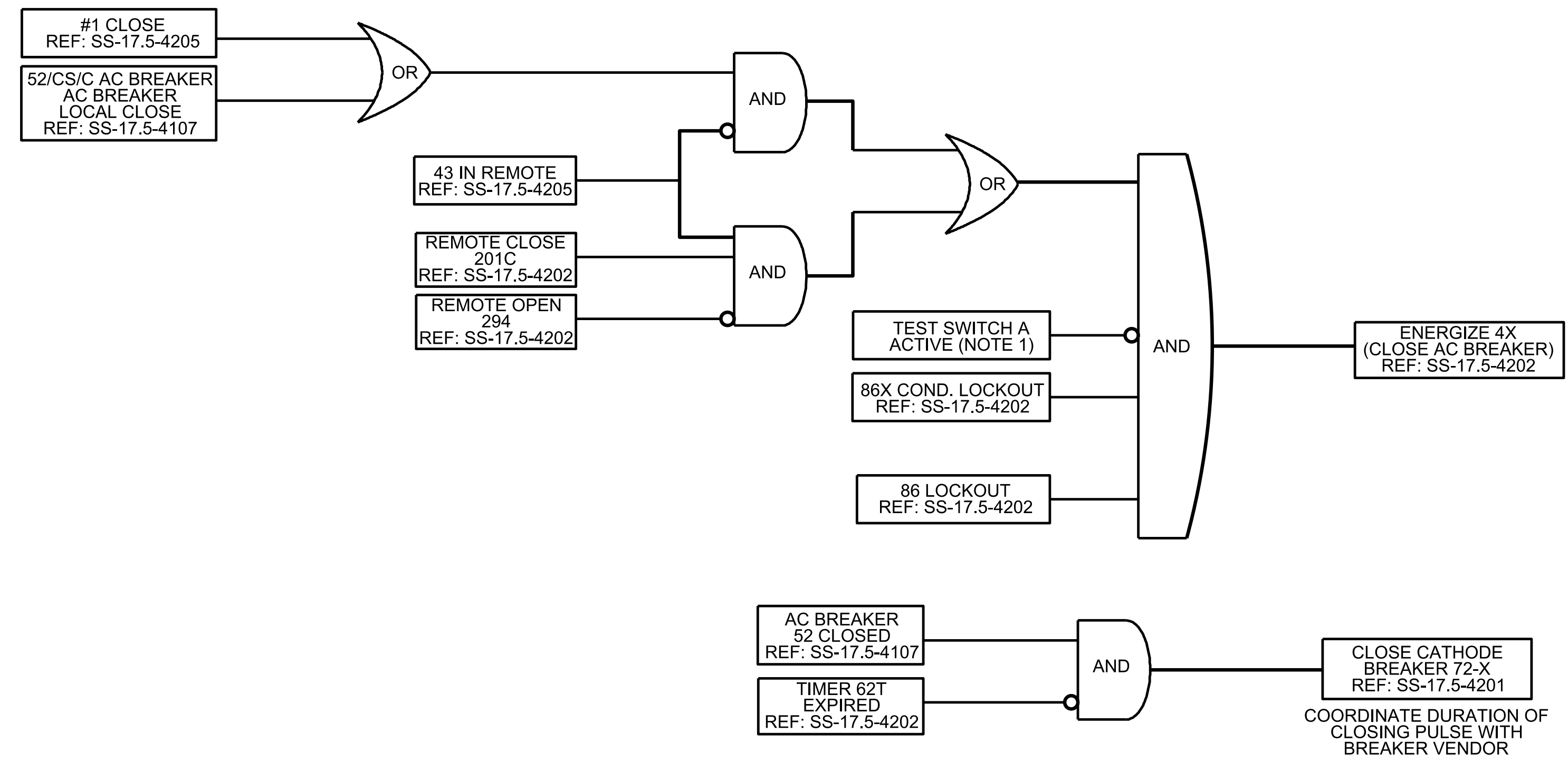
COORDINATE DURATION OF OPENING PULSE WITH BREAKER VENDOR

- NOTES:**
- TEST SWITCHES SHOWN IN THE LOGIC DIAGRAM SHALL BE SOFT KEYS PROGRAMMED ON THE HMI USED FOR THE ANNUNCIATOR. THE FOLLOWING KEYS SHALL BE AVAILABLE:
 - A TRIP AND BLOCK 52R AND 172R
 - B ENABLE TRIP TO 172R
 - C ENABLE TRIP TO 52R
 - D RESET 48 INCOMPLETE SEQUENCE
 - E ENABLE 48 INCOMPLETE SEQUENCE
 - F ENABLE 86 LOCKOUT
 - ALL LOGIC DIAGRAMS ARE FOR INFORMATION ONLY. THE SUPPLIER SHALL ENSURE THAT THE PLC CODE MATCHES ALL CONTRACTUAL REQUIREMENTS BASED ON THE EQUIPMENT PROVIDED.

PRINTED ON: S-DATES

				SUB CONSULTANT				PRIMARY CONSULTANT SEAL/ SIGNATURE				PRIMARY CONSULTANT				DESIGNED: A. ACHHAMMER				LOCATION NAME: RIVERDALE SUBSTATION				CAD FILE NUMBER: \$FILES\$							
																				TITLE: RECTIFIER PLC LOGIC DIAGRAM AC BREAKER/CATHODE TRIP SHEET 1 OF 4				SCALE: NTS				DISTRICT: MED			
0				7/28/2017				AA				ER				ISSUED FOR BID				MILE POST NO. 17.5											
REV	DATE	BY	APP	DESCRIPTION	REV	DATE	BY	APP	DESCRIPTION																						

AC BREAKER/CATHODE CLOSE



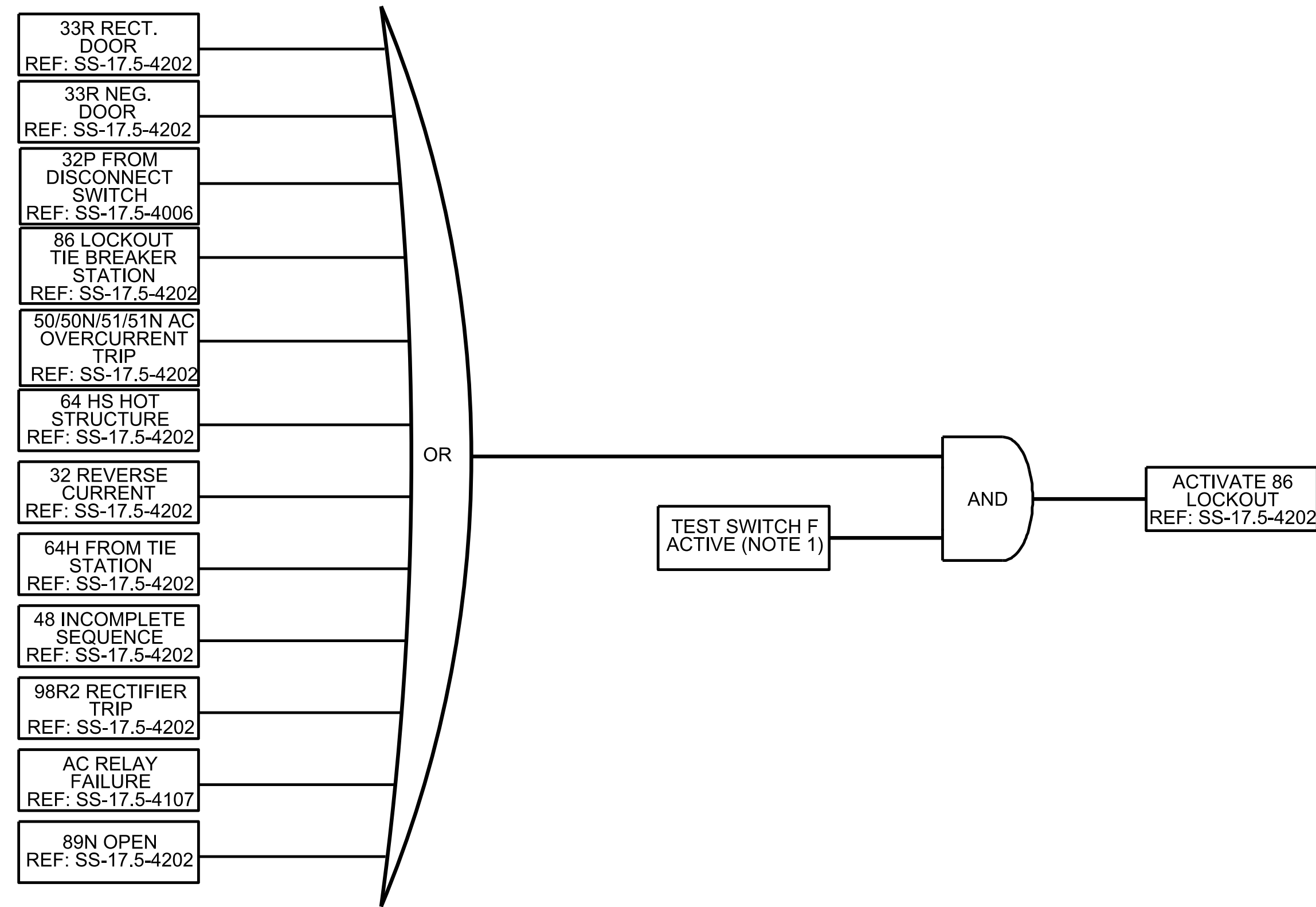
NOTES:

- TEST SWITCHES SHOWN IN THE LOGIC DIAGRAM SHALL BE SOFT KEYS PROGRAMMED ON THE HMI USED FOR THE ANNUNCIATOR. THE FOLLOWING KEYS SHALL BE AVAILABLE:
 - A TRIP AND BLOCK 52R AND 172R
 - B ENABLE TRIP TO 172R
 - C ENABLE TRIP TO 52R
 - D RESET 48 INCOMPLETE SEQUENCE
 - E ENABLE 48 INCOMPLETE SEQUENCE
 - F ENABLE 86 LOCKOUT
- ALL LOGIC DIAGRAMS ARE FOR INFORMATION ONLY. THE SUPPLIER SHALL ENSURE THAT THE PLC CODE MATCHES ALL CONTRACTUAL REQUIREMENTS BASED ON THE EQUIPMENT PROVIDED.

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				SUB CONSULTANT				PRIMARY CONSULTANT SEAL/ SIGNATURE				PRIMARY CONSULTANT				DESIGNED: A. ACHHAMMER				LOCATION NAME: RIVERDALE SUBSTATION				CAD FILE NUMBER: \$FILES\$							
																DRAWN: N. DIAZ								SCALE: NTS				DISTRICT: MED			
																								CHECKED: E. ROWE				PROJECT NO. GW4254-57102002			
																ENGINEERING DEPARTMENT				TITLE: RECTIFIER PLC LOGIC DIAGRAMS AC BREAKER/CATHODE CLOSE SHEET 2 OF 4				MILE POST NO. 17.5							
																547 W. JACKSON BOULEVARD															
																CHICAGO, ILLINOIS 60661															
																DATE: JUNE 12, 2017															
0	7/28/2017	AA	ER	ISSUED FOR BID				REV	DATE	BY	APP	DESCRIPTION																			

LOCKOUT LOGIC



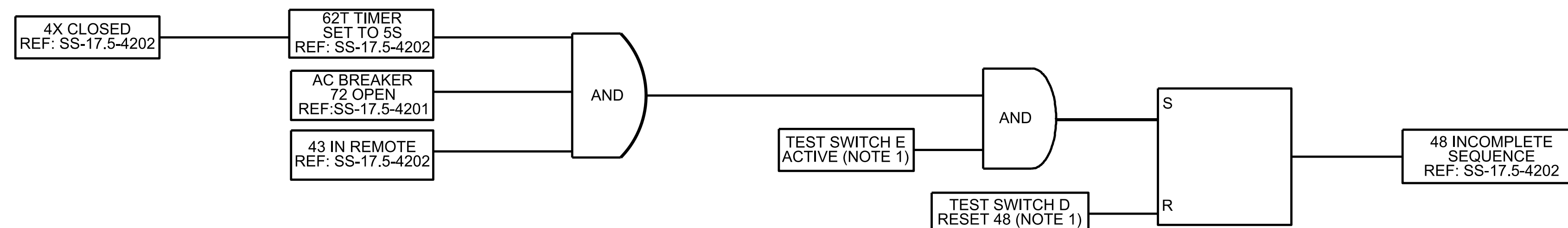
NOTES:

- TEST SWITCHES SHOWN IN THE LOGIC DIAGRAM SHALL BE SOFT KEYS PROGRAMMED ON THE HMI USED FOR THE ANNUNCIATOR. THE FOLLOWING KEYS SHALL BE AVAILABLE:
 - A TRIP AND BLOCK 52R AND 172R
 - B ENABLE TRIP TO 172R
 - C ENABLE TRIP TO 52R
 - D RESET 48 INCOMPLETE SEQUENCE
 - E ENABLE 48 INCOMPLETE SEQUENCE
 - F ENABLE 86 LOCKOUT
- ALL LOGIC DIAGRAMS ARE FOR INFORMATION ONLY. THE SUPPLIER SHALL ENSURE THAT THE PLC CODE MATCHES ALL CONTRACTUAL REQUIREMENTS BASED ON THE EQUIPMENT PROVIDED.

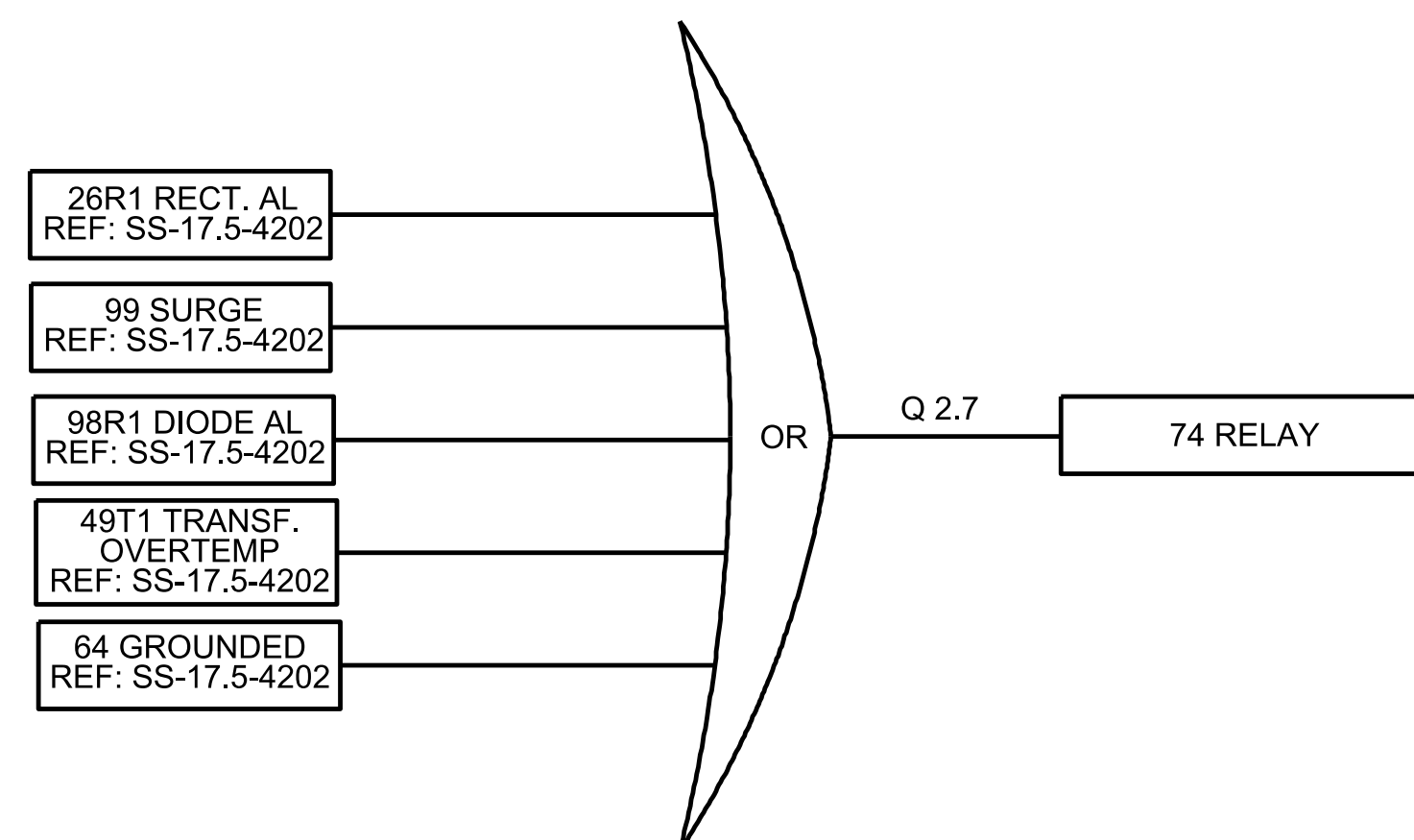
PRINTED ON: SDATES

				SUB CONSULTANT				PRIMARY CONSULTANT SEAL/ SIGNATURE				PRIMARY CONSULTANT				DESIGNED: A. ACHHAMMER				LOCATION NAME: RIVERDALE SUBSTATION				CAD FILE NUMBER: \$FILES\$			
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0 7/28/2017 AA ER ISSUED FOR BID												CHECKED: E. ROWE				DATE: JUNE 12, 2017											
REV	DATE	BY	APP	DESCRIPTION	REV	DATE	BY	APP	DESCRIPTION																		

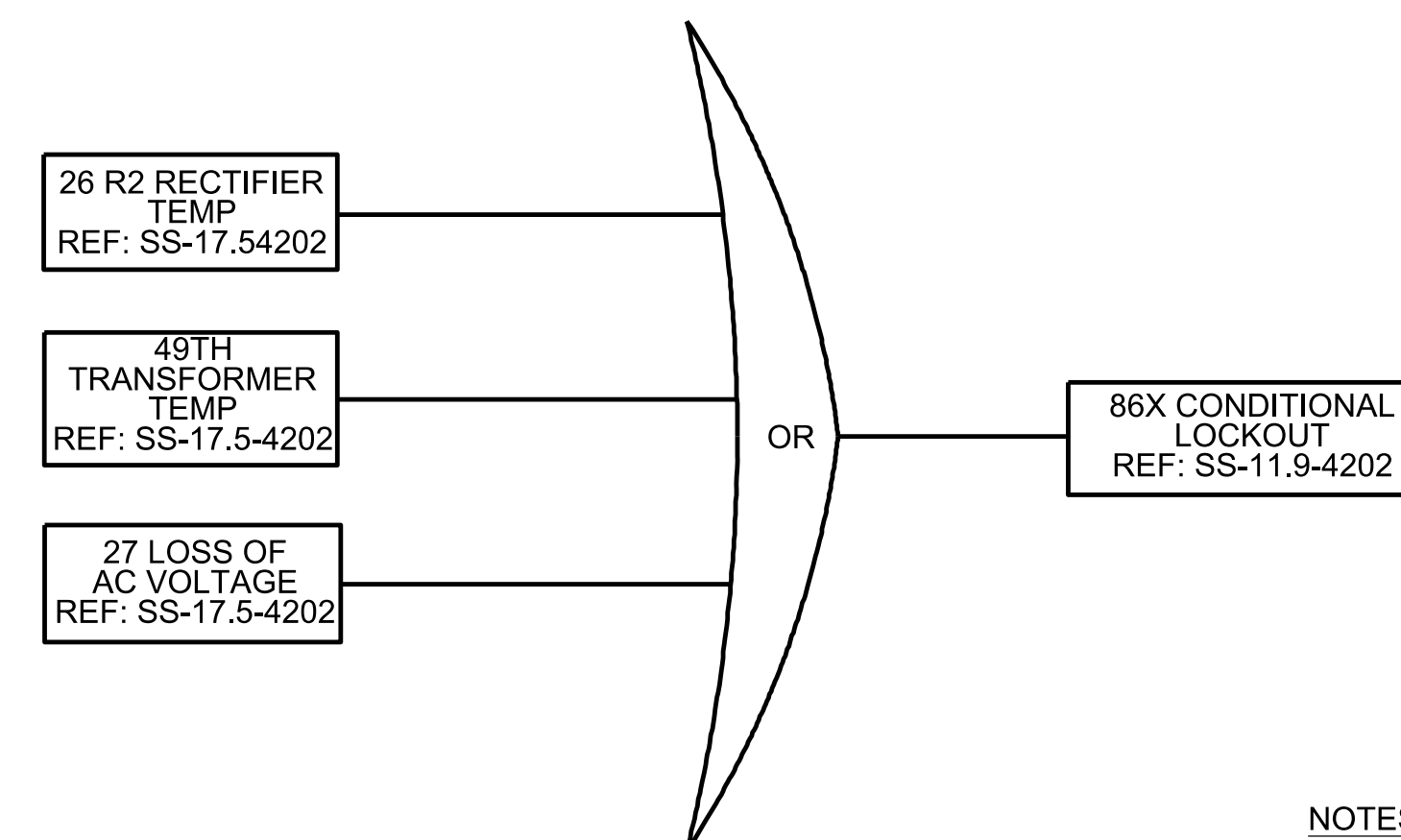
INCOMPLETE SEQUENCE



74 RELAY TROUBLE



CONDITIONAL LOCKOUT

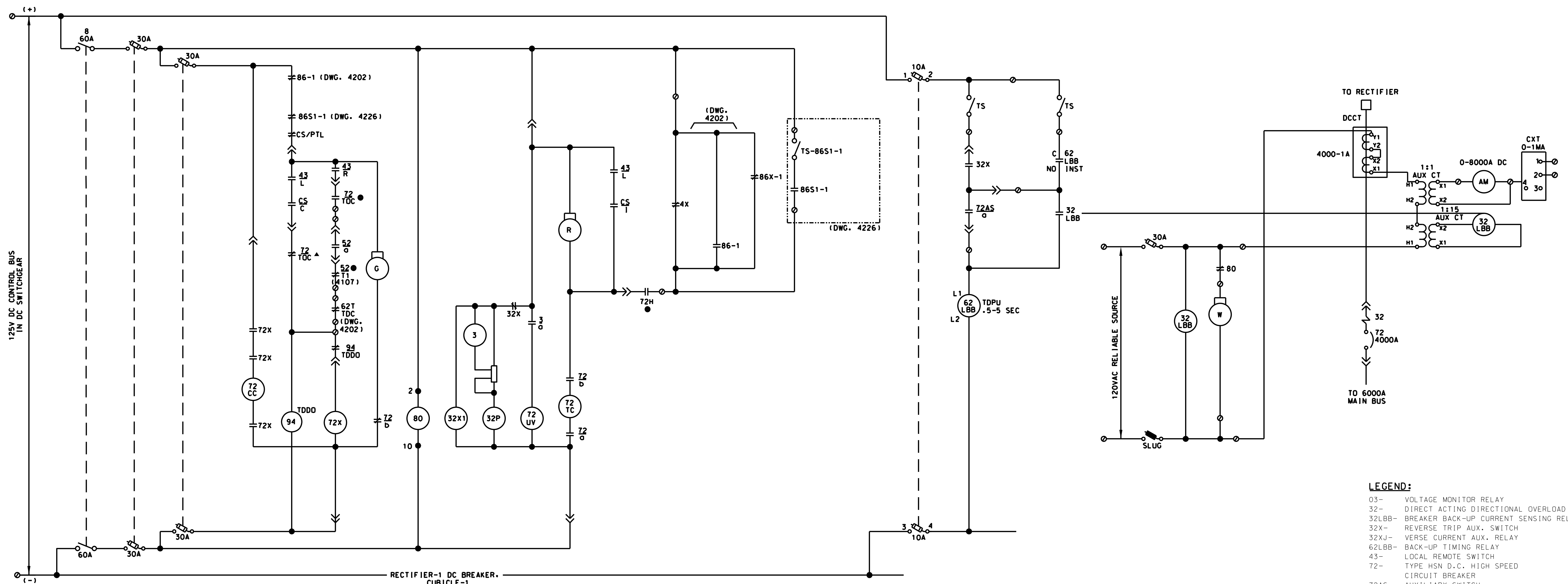


NOTES:

- TEST SWITCHES SHOWN IN THE LOGIC DIAGRAM SHALL BE SOFT KEYS PROGRAMMED ON THE HMI USED FOR THE ANNUNCIATOR. THE FOLLOWING KEYS SHALL BE AVAILABLE:
 - A TRIP AND BLOCK 52R AND 172R
 - B ENABLE TRIP TO 172R
 - C ENABLE TRIP TO 52R
 - D RESET 48 INCOMPLETE SEQUENCE
 - E ENABLE 48 INCOMPLETE SEQUENCE
 - F ENABLE 86 LOCKOUT
- ALL LOGIC DIAGRAMS ARE FOR INFORMATION ONLY. THE SUPPLIER SHALL ENSURE THAT THE PLC CODE MATCHES ALL CONTRACTUAL REQUIREMENTS BASED ON THE EQUIPMENT PROVIDED.

PRINTED ON: SDATES

				SUB CONSULTANT				PRIMARY CONSULTANT SEAL/ SIGNATURE				PRIMARY CONSULTANT				DESIGNED: A. ACHHAMMER				LOCATION NAME: RIVERDALE SUBSTATION				CAD FILE NUMBER: \$FILES\$							
																DRAWN: N. DIAZ								TITLE:				SCALE: NTS			
																								CHECKED: E. ROWE				PROJECT NO. GW4254-57102002			
																METRA P.M. R. CERANT				RECTIFIER PLC LOGIC DIAGRAM LOCKOUT AND ALARM LOGIC SHEET 4 OF 4				PROJECT NO. GW4254-57102002				SHEET NO. SS-17.5-4209			
																DATE: JUNE 12, 2017								MILE POST NO. 17.5							
0	7/28/2017	AA	ER	ISSUED FOR BID				REV	DATE	BY	APP	DESCRIPTION																			



- LEGEND:**
- 03- VOLTAGE MONITOR RELAY
 - 32- DIRECT ACTING DIRECTIONAL OVERLOAD
 - 32LBB- BREAKER BACK-UP CURRENT SENSING RELAY
 - 32X- REVERSE TRIP AUX. SWITCH
 - 32XJ- VERSE CURRENT AUX. RELAY
 - 62LBB- BACK-UP TIMING RELAY
 - 43- LOCAL REMOTE SWITCH
 - 72- TYPE HSN D.C. HIGH SPEED CIRCUIT BREAKER
 - 72AS- AUXILIARY SWITCH
 - 72CC- CLOSING SOLENOID
 - CS- CONTROL SWITCH
 - 72TC- SHUNT TRIP
 - 72UV- UNDER VOLTAGE COIL
 - 72X- CLOSING CONTACTOR
 - 76- DIRECT ACTING OVERLOAD
 - INST- INSTANTANEOUS
 - T00- TIME DELAY OPEN
 - A- AMBER INDICATING LIGHT
 - G- GREEN INDICATING LIGHT
 - R- RED INDICATING LIGHT

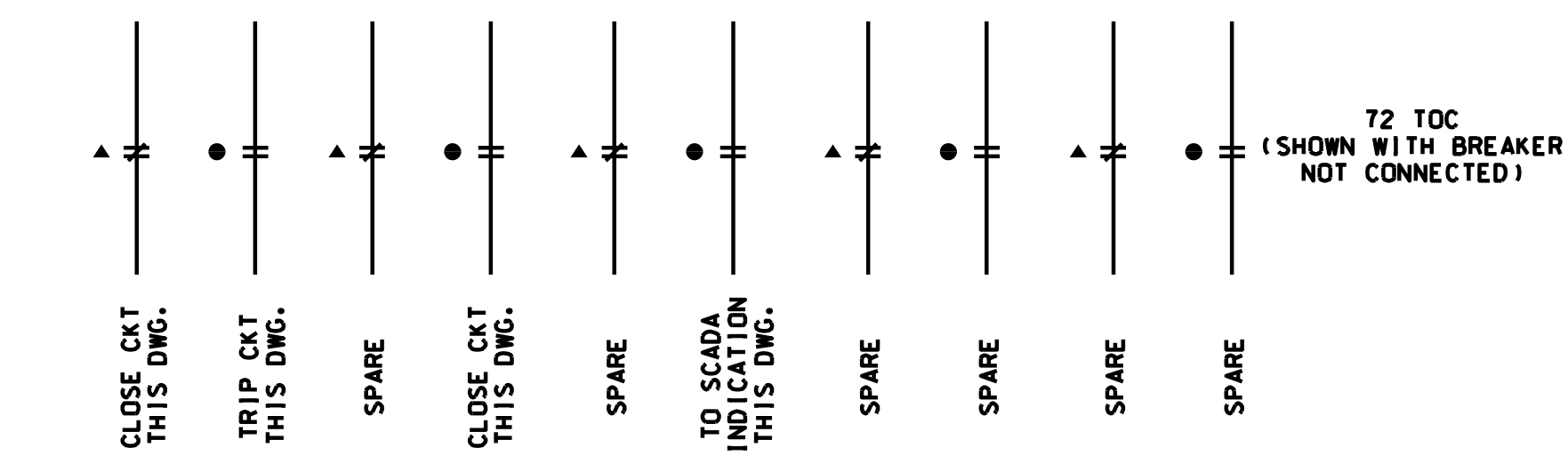
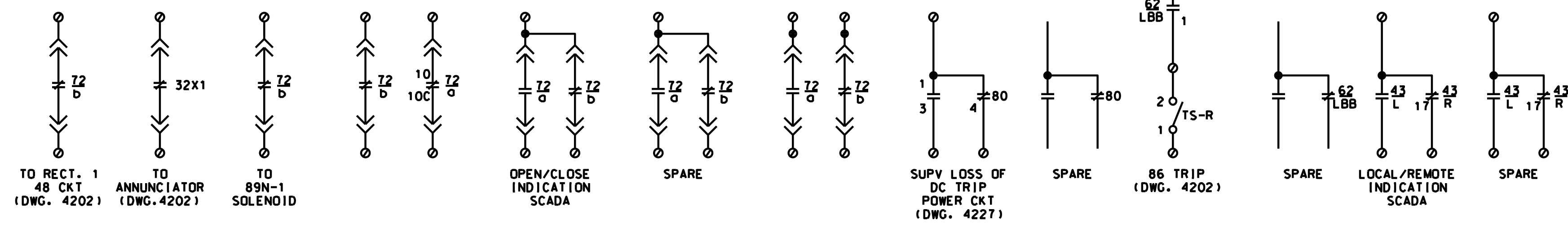
CONTROL SWITCH DEVICE-CS

CONTACTS	POSITION			
	PULL OUT	TRIP	OFF TRIP	AFTER CLOSE
1-2	L0	X	X	X
3-4	T	X		X
5-6	O		X	X
7-8	C			X
9-10	SC			X

SELECTOR SWITCH DEVICE-43

CONTACTS	POSITION	
	REMOTE	LOCAL
1-2	R	X
3-4	L	X
5-6	R	X
7-8	L	X
9-10	R	X
11-12	L	X

NON-SPRING RETURN.
REMOTE POSITION AT 12 O' CLOCK.
LOCAL POSITION CLOCKWISE WHEN FACING FRONT OF SWITCH.



PRINTED ON: SDATES

REV	DATE	BY	APP	DESCRIPTION
0	07-28-2017	HS	HS	ISSUED FOR BID

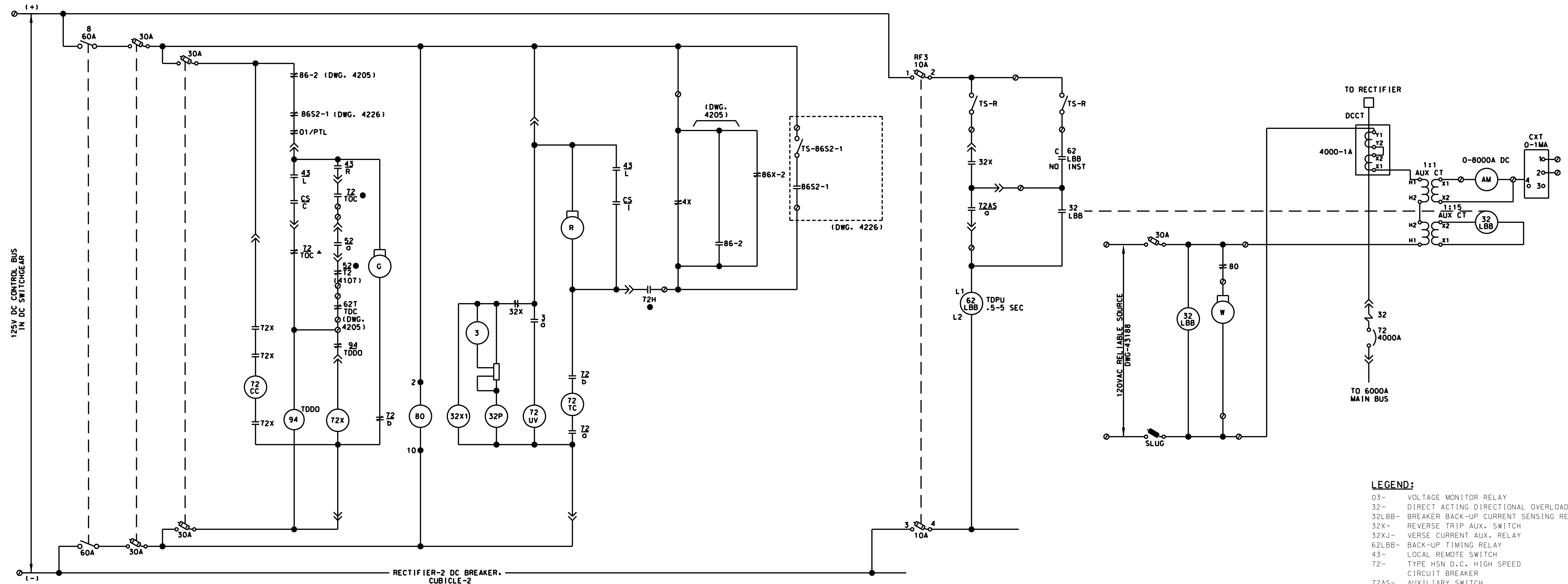


DESIGNED: HS
DRAWN: JMC
CHECKED: FM
METRA P.M.: R. CERANT
DATE: JUNE 12, 2017



LOCATION NAME: RIVERDALE SUBSTATION
TITLE: 1500V DC SCHEMATIC DIAGRAM RECTIFIER-1 BREAKER 72-1

CAD FILE NUMBER: SS-17.5-4210.DGN
SCALE: NTS
PROJECT NO. GW4254-57102002
MILE POST NO. 17.5
DISTRICT: MED
SHEET NO. SS-17.5-4210



- LEGEND:**
- 03- VOLTAGE MONITOR RELAY
 - 32- DIRECT ACTING DIRECTIONAL OVERLOAD
 - 32LBB- BREAKER BACK-UP CURRENT SENSING RELAY
 - 32X- REVERSE TRIP AUX. SWITCH
 - 32XJ- VERSE CURRENT AUX. SWITCH
 - 62LBB- BACK-UP TIMING RELAY
 - 43- LOCAL REMOTE SWITCH
 - 72- TYPE HSN D.C. HIGH SPEED CIRCUIT BREAKER
 - 72AS- AUXILIARY SWITCH
 - 72CC- CLOSING SOLENOID
 - CS- CONTROL SWITCH
 - 72TC- SHUNT TRIP
 - 72UV- UNDER VOLTAGE COIL
 - 72X- CLOSING CONTACTOR
 - 76- DIRECT ACTING OVERLOAD
 - INST- INSTANTANEOUS
 - TDO- TIME DELAY OPEN
 - A- AMBER INDICATING LIGHT
 - G- GREEN INDICATING LIGHT
 - R- RED INDICATING LIGHT

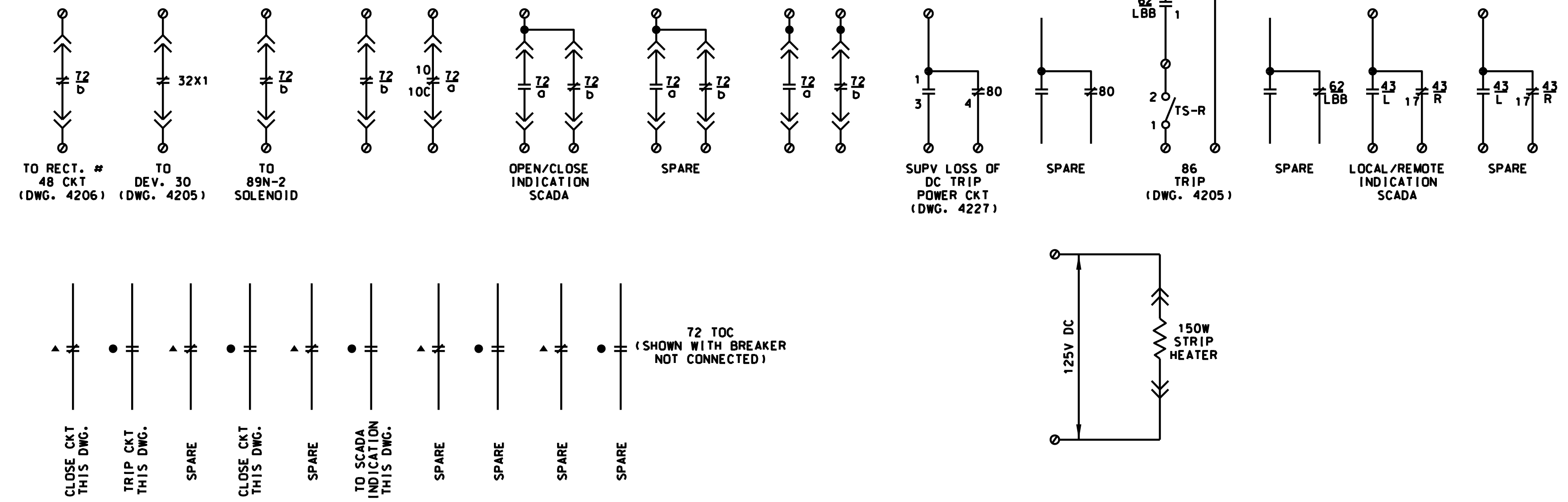
CONTROL SWITCH DEVICE-CS

CONTACTS	POSITION			
	PULL OUT	TRIP	OFF TRIP	AFTER CLOSE
1-2	X	X	X	X
3-4	X			X
5-6			X	X
7-8				X
9-10			X	X

SELECTOR SWITCH DEVICE-43

CONTACTS	POSITION	
	REMOTE	LOCAL
1-2	X	
3-4		X
5-6	X	
7-8		X
9-10	X	
11-12		X

NON-SPRING RETURN.
REMOTE POSITION AT 12 O' CLOCK.
LOCAL POSITION CLOCKWISE WHEN FACING FRONT OF SWITCH.



PRINTED ON: SDATES

REV	DATE	BY	APP	DESCRIPTION
0	07-28-2017	HS	HS	ISSUED FOR BID

CONSULTANT SEAL & SIGNATURE



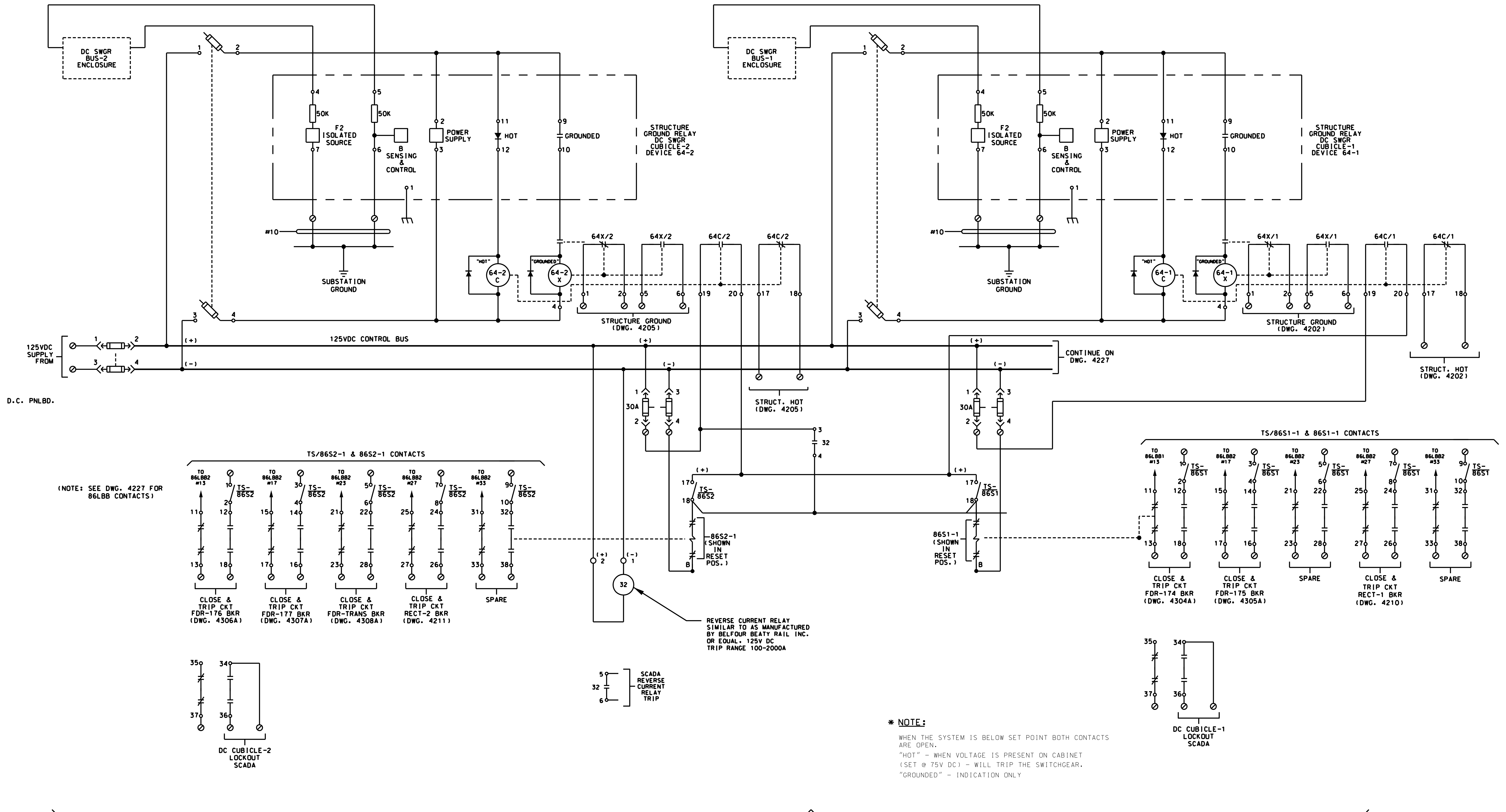
CONSULTANT
IDP
 A Company of
Gannett Fleming
 Consulting Engineers
 20 N. Wacker Dr. Ste. 1500 Chicago Il. 60606

DESIGNED: HS
 DRAWN: JMC
 CHECKED: FM
 METRA P.M.: R. CERANT
 DATE: JUNE 12, 2017



LOCATION NAME:
RIVERDALE SUBSTATION
 TITLE:
**1500V DC SCHEMATIC DIAGRAM
 RECTIFIER-2 BREAKER 72-2**

CAD FILE NUMBER: SS-17.5-4211.DGN
 SCALE: NTS
 PROJECT NO. GW4254-57102002
 MILE POST NO. 17.5
 DISTRICT: MED
 SHEET NO. **SS-17.5-4211**



DC SWGR-STRUCTURE GRD RELAY, CUBICLE-2

DC SWGR-STRUCTURE GRD RELAY, CUBICLE-1

PRINTED ON: 07/28/2017

REV	DATE	BY	APP	DESCRIPTION
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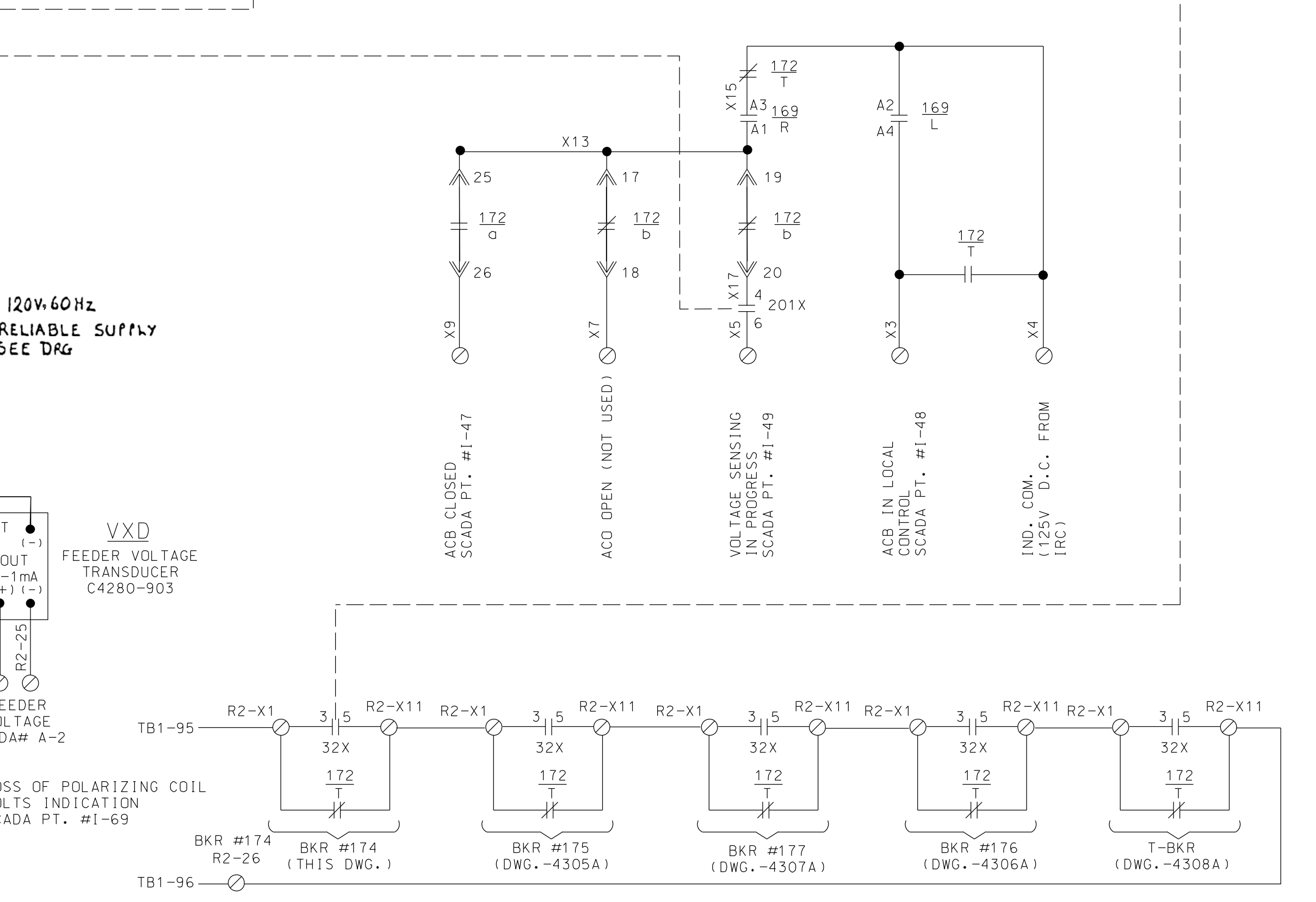
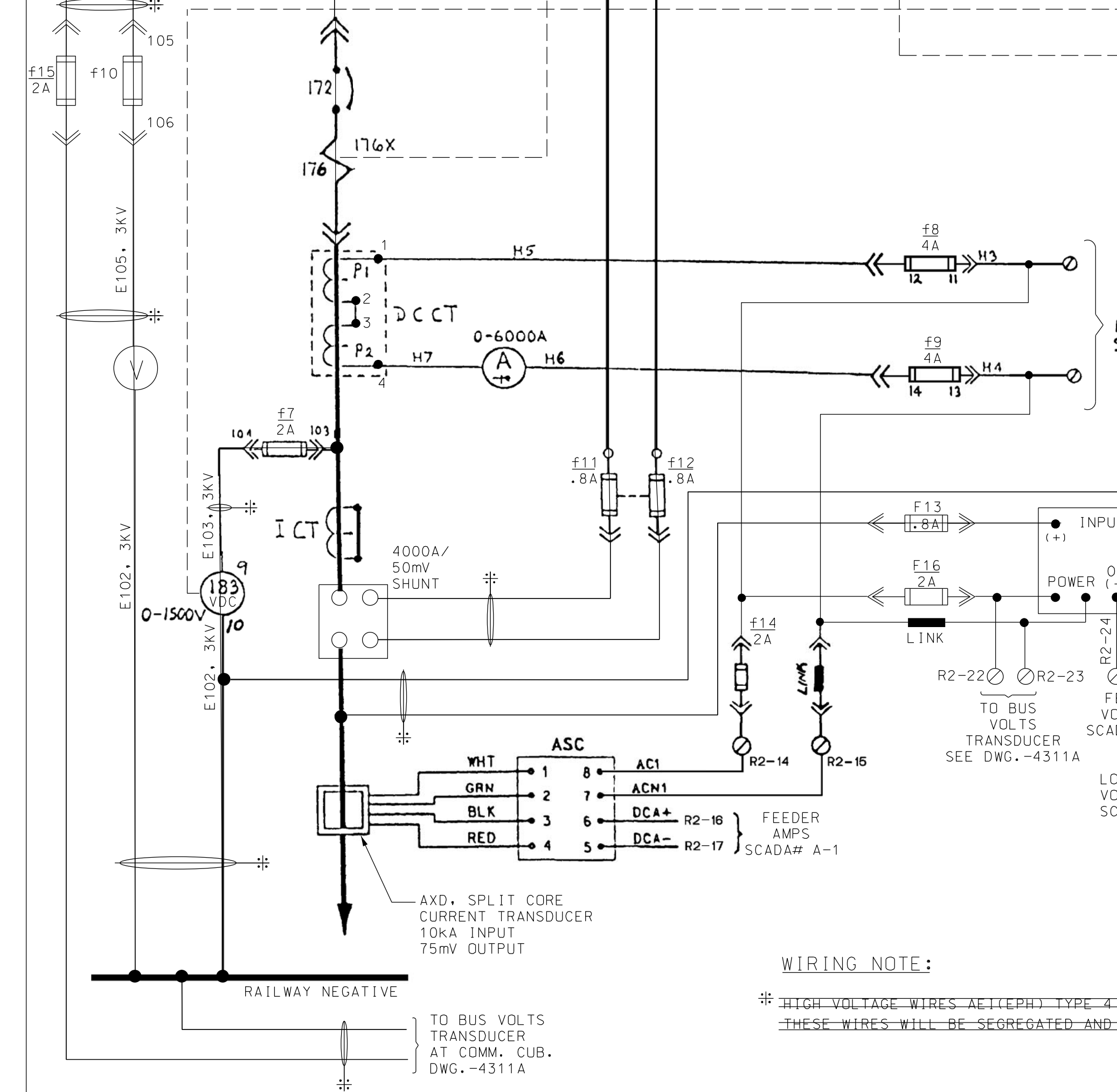
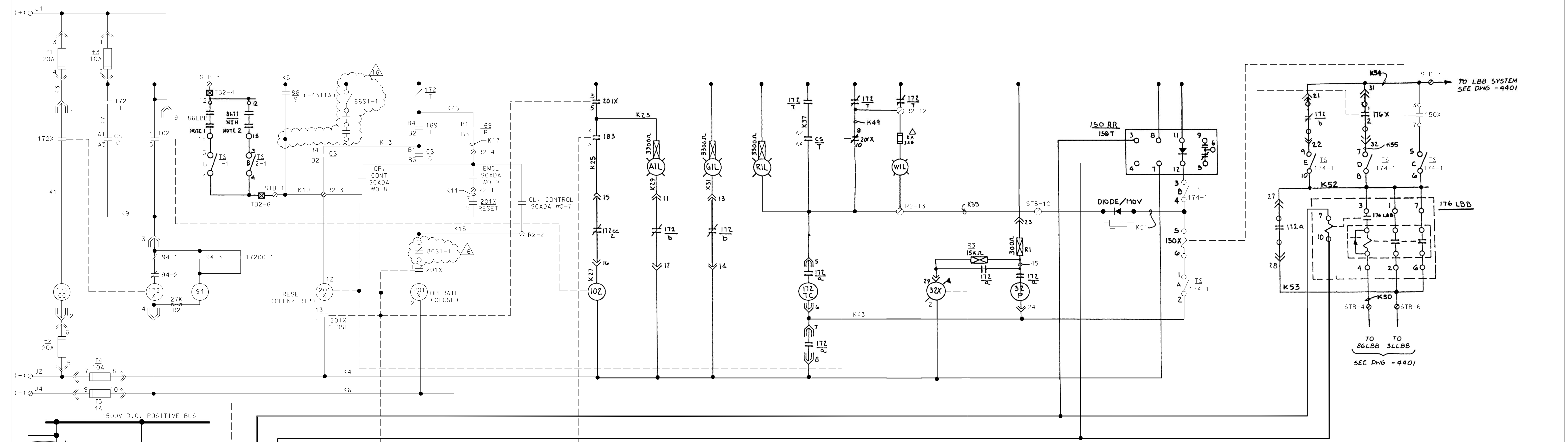
REV	DATE	BY	APP	DESCRIPTION

CONSULTANT SEAL & SIGNATURE

CONSULTANT

DESIGNED: HS
DRAWN: JMC
CHECKED: FM
METRA P.M.: R. CERANT
DATE: JUNE 12, 2017

LOCATION NAME: RIVERDALE SUBSTATION	CAD FILE NUMBER: SS-17.5-4226.DGN
TITLE: 1500V DC SCHEMATIC DIAGRAM DC SWITCHGEAR GROUND RELAY	SCALE: NTS
	DISTRICT: MED
	PROJECT NO. GW4254-57102002
	SHEET NO. SS-17.5-4226
	MPLE POST NO. 17.5



- DEVICE LEGEND**
- 30LBB LBB ANNUNCIATOR TARGET RELAY
 - 32P POLARISING COIL FOR 176 TRIPPING 125VDC 2x50 OHM COILS
 - 32X FLAG INDICATION RELAY FOR LOSS OF 32P VOLTAGE
 - 62LBB TIMING RELAY 0.1 - 6.0 SEC.
 - 62TT TT TIMING RELAY 0.1 - 6.0 SEC.
 - 64D GROUND FAULT SENSING RELAY
 - 64XX AUX. RELAY FOR GROUND FAULT TRANSFER TRIP
 - 86/S LOCKOUT RELAY
 - 86LBB BREAKER BACKUP LOCKOUT RELAY (MANUAL RESET)
 - 86TT TRANSFER TRIP LOCKOUT RELAY (ELECT. RESET)
 - 94 CLOSING COIL CUT OFF (ANTI-PUMP) RELAY 125VDC
 - 94TT TRANSFER TRIP OUTPUT RELAY
 - 102 RECLOSING TIMER (SET AT 3.5 SECS.)
 - 127 AC SUPPLY CHANGE OVER RELAY
 - 150RR RATE OF RISE OVERCURRENT RELAY
 - 150T TIME OVERCURRENT RELAY
 - 150X AUXILIARY RELAY FOR LBB ON 150RR/150T
 - 169 LOCAL - REMOTE SWITCH
 - 172 D.C. FEEDER BREAKER
 - 172a-b BREAKER OPEN-CLOSE STATUS SWITCH
 - 1720C BREAKER CLOSING COIL 125VDC 1.8 OHM
 - 172T BREAKER CARRIAGE POSITION SWITCH
 - 172TC SHUNT TRIP COIL 125VDC 20 OHM
 - 172X CLOSING COIL CONTACTOR 125VDC 650 OHM
 - 176 MAGNETIC SERIES TRIP D/C DEVICE CAL. 3.5-4.5-6-7-8KA
 - 176F D/C RELAY (0-6000A SCALE) 120V, 60HZ. HIGH SAT. POINT
 - 176LBB LBB D.C. CURRENT SENSING RELAY
 - 176TD D/C RELAY, TIMER 125VDC (SAT. AT 20SEC) IN CASE W/ 176F
 - 176X AUXILIARY RELAY FOR MAGNETIC SERIES TRIP
 - 183 VOLTAGE MEASURING TRANSFER RELAY
 - 94TT TRANSFER TRIP OUTPUT RELAY
 - 201 EMERGENCY CLOSE RELAY (REMOTE CONTACT)
 - 201D BREAKER MASTER CONTROL RELAY (LATCHING TYPE)
 - 201X SUPERVISORY TRIP RELAY (REMOTE CONTACT)
 - 294 CONTROL SWITCH FOR TRANSFER TRIP BY-PASS
 - 301TT
- DEVICE ABBREVIATIONS**
- A AMMETER 0-6000A (0-2AFSD) RECT. MOVING COIL LONG SCALE
 - AIL AMBER INDICATION LAMP- AUTO CLOSE IN OPERATION 125V
 - C CLOSE
 - CC CLOSING COIL
 - CS CONTROL SWITCH TRIP- NEUTRAL- CLOSE
 - DCCT D.C. CURRENT TRANSDUCER 3000/1A 120V, 60HZ
 - DIODE/MOV DIRECTIONAL BLOCKING DIODE/METAL OXIDE VARISTOR
 - GIL GREEN INDICATION LAMP- C.B. OPEN. 125V
 - L LOCAL CONTROL MODE
 - LBB LOCAL BREAKER BACKUP
 - OP OPERATE
 - R REMOTE CONTROL MODE
 - RE RESET
 - REI RED INDICATION LAMP- C.B. CLOSED. 125V
 - RIL SWITCHBOARD D.C. SHUNT
 - T TRIP
 - T.S. TEST SWITCH
 - TT TRANSFER TRIP
 - V VOLTMETER (0-2000V) MOVING COIL, LONGSCALE DIRECT READING
 - VR1 ATTENUATOR 200 OHM VARIABLE
 - TEST LINK TEST LINK
 - ASC D.C. CURRENT SIGNAL CONDITIONER
 - AXD SPLIT CORE D.C. CURRENT TRANSDUCER
 - XCA D.C. VOLTS TRANSDUCER CALIBRATOR
 - VXD D.C. VOLTS TRANSDUCER
 - WIL WHITE INDICATING LIGHT

CIRCUIT WITHIN THE CLOUD INDICATES NEW WORK UNDER THIS CONTRACT

NOTE: SCHEMATIC DIAGRAM IS PRESENTED IN BREAKER OPEN AND IN SERVICE POSITION. ALL RELAYS DE-ENERGIZED.

REFERENCE DRAWINGS
 LBB SYSTEM SCHEMATIC DIAGRAM SS-175-4401
 TRANSFER TRIP SCHEMATIC DIAGRAM SS-175-4402

WIRING NOTE:
 * HIGH VOLTAGE WIRES (TYPE 4 (1900/3300V)). THESE WIRES WILL BE SEGREGATED AND RUN SEPARATELY FROM OTHER WIRES.

- BREAKER CONTACTS LEGEND:**
- ⊙ MULTICORE TERMINATION
 - BUS WIRING TB
 - △ LOCATED IN SEPARATE ENCLOSURE
 - ⊕ CARRIAGE SWITCH OPEN IN SERVICE
 - ⊖ CARRIAGE SWITCH CLOSED IN SERVICE POSITION
 - ⊕ AUX. SWITCH OPEN IN CB OPEN POSITION
 - ⊖ AUX. SWITCH CLOSED IN CB CLOSED POSITION
 - ⊕ AUX. SWITCH CLOSED IN CB OPEN POSITION
 - ⊖ AUX. SWITCH OPEN IN CB CLOSED POSITION
 - ⊕ MINOR DISCONNECT CONTACT CLOSED ONLY WHEN CIRCUIT BREAKER IS IN 'SERVICE' POSITION
 - ⊖ MINOR DISCONNECT CONTACT CLOSED WHEN CIRCUIT BREAKER IS IN 'TEST' POSITION AND 'SERVICE' POSITION
- LEGEND:**
- ⊙ TERMINAL POINT AT 1500 V D.C. SWITCHGEAR
 - ⊕ TERMINAL POINT AT 12.4 KV A.C. SWITCHGEAR
 - ⊖ TERMINAL POINT AT 4 KV A.C. SWITCHGEAR
 - ⊕ TERMINAL POINT AT RECTIFIER CONTROL PANEL
 - ⊖ TERMINAL POINT AT TRANSFORMER CONTROL PANEL
 - ⊕ TERMINAL POINT AT TRANSFER TRIP & LBB SWITCHBOARD
 - ⊖ TERMINAL POINT AT SUPERVISORY CONTROL CABINET
 - ⊕ TERMINAL POINT AT BUS FAULT RELAY PANEL OR CONTROL SWITCHBOARD OR OTHER MISC. PANELS.
- LAST WIRE NO. K60

Metra
Metropolitan Rail

**ENGINEERING DEPARTMENT
CHICAGO, ILLINOIS**

D.C. FEEDER BREAKER
SECTION NO. 174
SCHEMATIC DIAGRAM

RIVERDALE TIE STATION

MFG BY WHIPP & BOURNE LTD W & B DWG. NO 418766

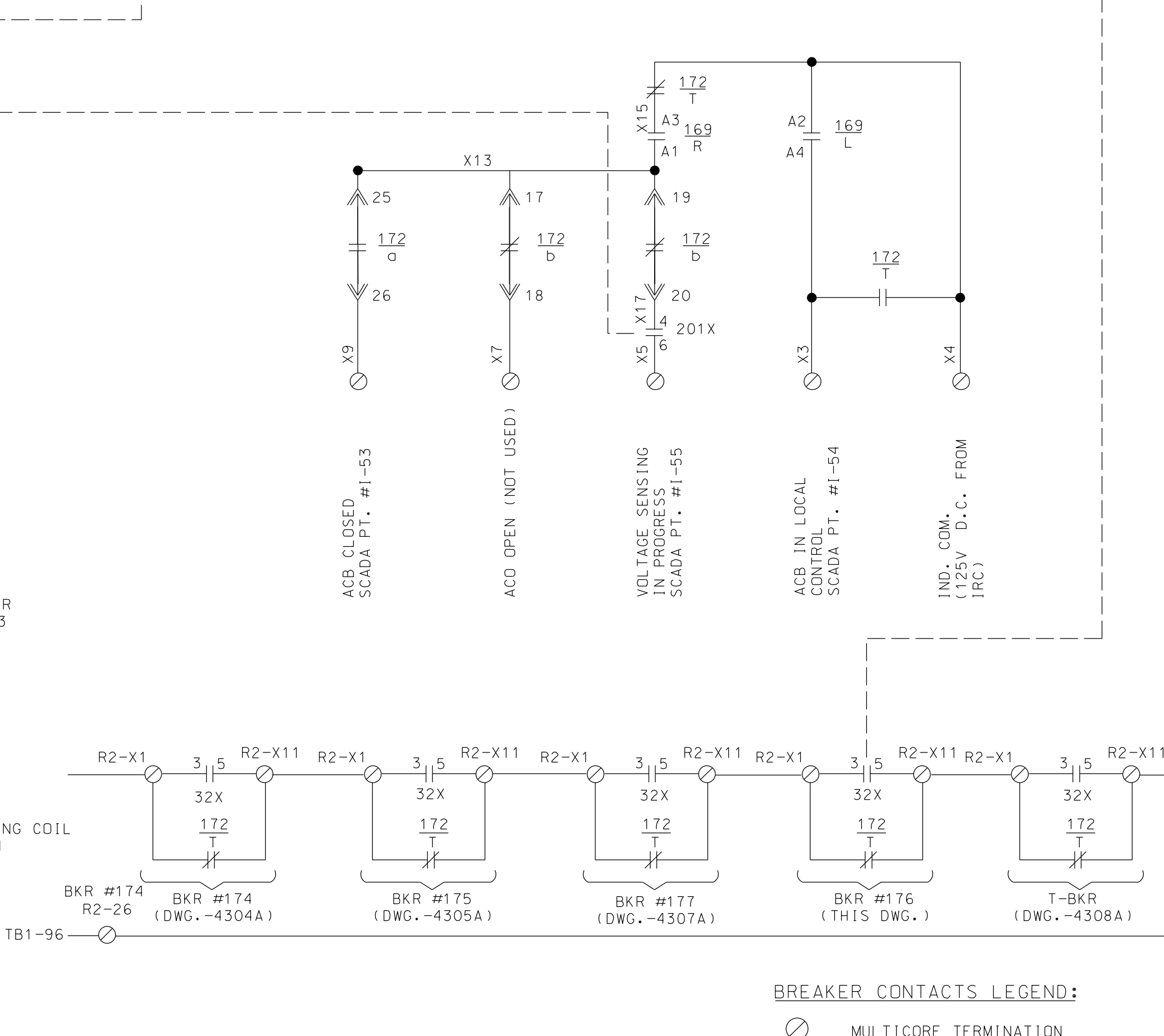
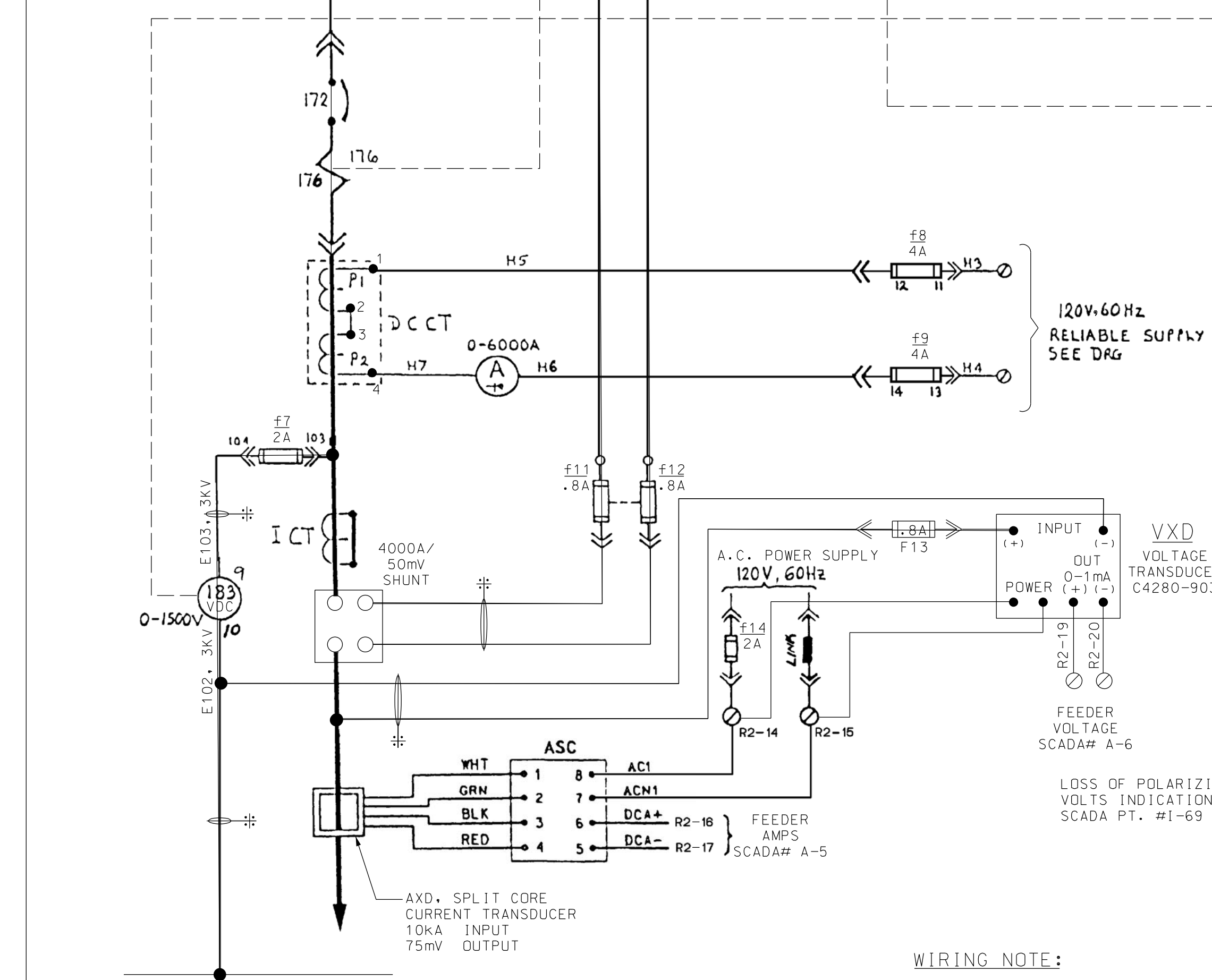
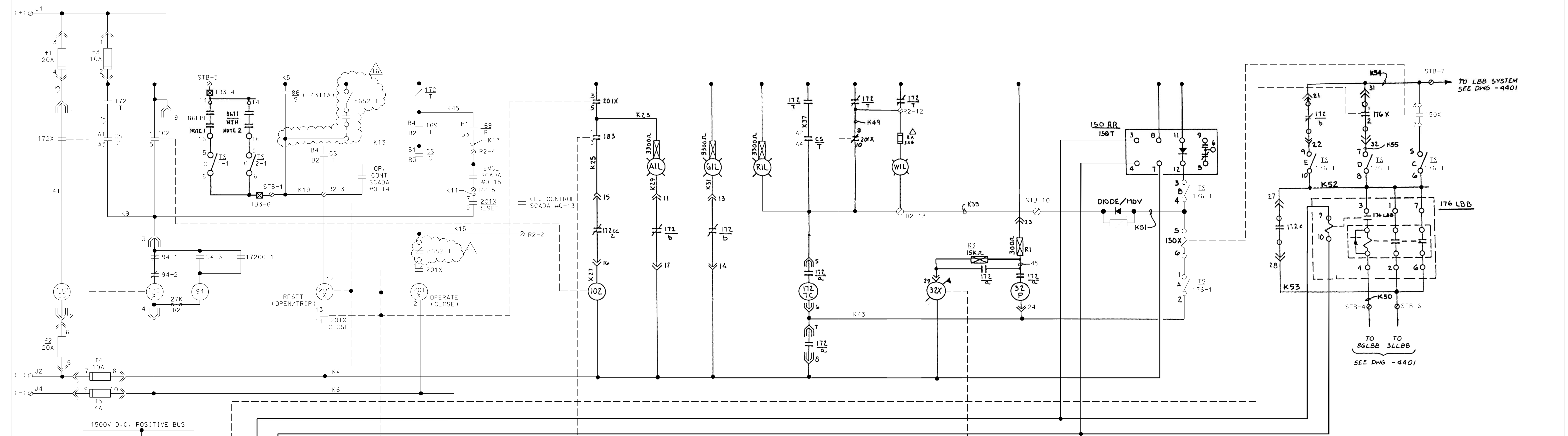
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DESIGNED	DRAWN	CHECKED	APPROVED
-	AZ/CM	WPS	WPS

DISTRIB	DATE	PRINT NUMBER
	5/17/18	
METRA ELECTRIC	SCALE NONE	SS-17.5-4304A

BY LDP

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16



- DEVICE LEGEND**
- 30LBB 32P LBB ANNUNCIATOR TARGET RELAY
 - 62LBB 62TT TIMING RELAY 0.1 - 6.0 SEC.
 - 64D GROUND FAULT SENSING RELAY
 - 64XX 64X/AUX. RELAY FOR GROUND FAULT TRANSFER TRIP LOCKOUT RELAY
 - 86LBB 86/S BREAKER BACKUP LOCKOUT RELAY (MANUAL RESET)
 - 86TT 86TT TRANSFER TRIP LOCKOUT RELAY (ELECT. RESET)
 - 94 94TT CLOSING COIL CUT OFF (ANTI-PUMP) RELAY 125VDC
 - 94TT 94TT TRANSFER TRIP OUTPUT RELAY
 - 102 102T RECLOSING TIMER (SET AT 3.5 SECS.)
 - 127 127T AC SUPPLY CHANGE OVER RELAY
 - 150RR 150RR RATE OF RISE OVERCURRENT RELAY
 - 150T 150T TIME OVERCURRENT RELAY
 - 150X 150X AUXILIARY RELAY FOR LBB ON 150RR/150T LOCAL - REMOTE SWITCH
 - 172 172T D.C. FEEDER BREAKER
 - 172a-b 172a-b BREAKER OPEN-CLOSE STATUS SWITCH
 - 172CC 172CC BREAKER CLOSING COIL 125VDC 1.8 OHM
 - 172T 172T BREAKER CARRIAGE POSITION SWITCH
 - 172TC 172TC SHUNT TRIP COIL 125VDC 20 OHM
 - 172X 172X CLOSING COIL CONTACTOR 125VDC 650 OHM
 - 176 176T MAGNETIC SERIES TRIP O/C DEVICE CAL. 3.5-4.5-5.6-7-8KA
 - 176F 176F O/C RELAY (0-6000A SCALE) 120V., 60HZ. HIGH SAT. POINT
 - 176LBB 176LBB LBB D.C. CURRENT SENSING RELAY O/C RELAY, TIMER 125VDC (SAT. AT 20SEC) IN CASE W/ 176F
 - 176X 176X AUXILIARY RELAY FOR MAGNETIC SERIES TRIP
 - 183 183T VOLTAGE MEASURING TRANSFER RELAY
 - 201 201T SUPERVISORY CLOSE RELAY (REMOTE CONTACT)
 - 201D 201D EMERGENCY CLOSE RELAY (REMOTE CONTACT)
 - 201X 201XT BREAKER MASTER CONTROL RELAY (LATCHING TYPE) SUPERVISORY TRIP RELAY (REMOTE CONTACT)
 - 294 294T CONTROL SWITCH FOR TRANSFER TRIP BY-PASS
 - 301TT 301TT CONTROL SWITCH FOR TRANSFER TRIP BY-PASS
- DEVICE ABBREVIATIONS**
- A AMMETER 0-6000A (0-2AFSD) RECT. MOVING COIL LONG SCALE
 - AIL AMBER INDICATION LAMP- AUTO CLOSE IN OPERATION 125V
 - C CLOSE
 - CC CLOSING COIL
 - CS CONTROL SWITCH TRIP- NEUTRAL- CLOSE
 - DCCT D.C. CURRENT TRANSDUCER 3000/1A 120V, 60HZ
 - DIODE/MOV DIRECTIONAL BLOCKING DIODE/METAL OXIDE VARISTOR
 - GIL GREEN INDICATION LAMP- C.B. OPEN, 125V
 - L LOCAL CONTROL MODE
 - LBB LOCAL BREAKER BACKUP
 - OP OPERATE
 - R REMOTE CONTROL MODE
 - RE RESET
 - RIL RED INDICATION LAMP- C.B. CLOSED, 125V
 - SHUNT SWITCHBOARD D.C. SHUNT
 - T TRIP
 - T.S. TEST SWITCH
 - TT TRANSFER TRIP
 - V VOLTMETER (0-2000V) MOVING COIL, LONGSCALE DIRECT READING
 - VR1 ATTENUATOR 200 OHM VARIABLE
 - T-L. TEST LINK
 - ASC D.C. CURRENT SIGNAL CONDITIONER
 - AXD SPLIT CORE D.C. CURRENT TRANSDUCER
 - XCA D.C. VOLTS TRANSDUCER CALIBRATOR
 - VXD D.C. VOLTS TRANSDUCER
 - WIL WHITE INDICATING LIGHT

CIRCUIT WITHIN THE CLOUD INDICATES NEW WORK UNDER THIS CONTRACT

WIRING NOTE:
 * HIGH VOLTAGE WIRES ARE (EPH) TYPE 4 (1900/3300V).
 THESE WIRES WILL BE SEGREGATED AND RUN SEPARATELY FROM OTHER WIRES.

- BREAKER CONTACTS LEGEND:**
- ⊗ MULTICORE TERMINATION
 - BUS WIRING TB
 - △ LOCATED IN SEPARATE ENCLOSURE
 - ⊕ CARRIAGE SWITCH OPEN IN SERVICE
 - ⊖ CARRIAGE SWITCH CLOSED IN SERVICE POSITION
 - ⊕ AUX. SWITCH OPEN IN CB OPEN POSITION
 - ⊖ AUX. SWITCH CLOSED IN CB OPEN POSITION
 - ⊕ AUX. SWITCH OPEN IN CB CLOSED POSITION
 - ⊖ AUX. SWITCH CLOSED IN CB CLOSED POSITION
 - ⊕ MINOR DISCONNECT CONTACT CLOSED ONLY WHEN CIRCUIT BREAKER IS IN 'SERVICE' POSITION
 - ⊖ MINOR DISCONNECT CONTACT CLOSED WHEN CIRCUIT BREAKER IS IN 'TEST' POSITION AND 'SERVICE' POSITION
- LEGEND:**
- ⊗ TERMINAL POINT AT 1500 V D.C. SWITCHGEAR
 - ⊕ TERMINAL POINT AT 12.4 KV A.C. SWITCHGEAR
 - ⊖ TERMINAL POINT AT 4 KV A.C. SWITCHGEAR
 - ⊕ TERMINAL POINT AT RECTIFIER CONTROL PANEL
 - ⊖ TERMINAL POINT AT TRANSFORMER CONTROL PANEL
 - ⊕ TERMINAL POINT AT TRANSFER TRIP & LBB SWITCHBOARD
 - ⊖ TERMINAL POINT AT SUPERVISORY CONTROL CABINET
 - ⊕ TERMINAL POINT AT BUS FAULT RELAY PANEL OR CONTROL SWITCHBOARD OR OTHER MISC. PANELS.
- LAST WIRE NO. K60

REFERENCE DRAWINGS
 LBB SYSTEM SCHEMATIC DIAGRAM 55-175-4401
 TRANSFER TRIP SCHEMATIC DIAGRAM 55-175-4402

Metra ENGINEERING DEPARTMENT
 CHICAGO, ILLINOIS

D.C. FEEDER BREAKER
 SECTION NO. 176
 SCHEMATIC DIAGRAM

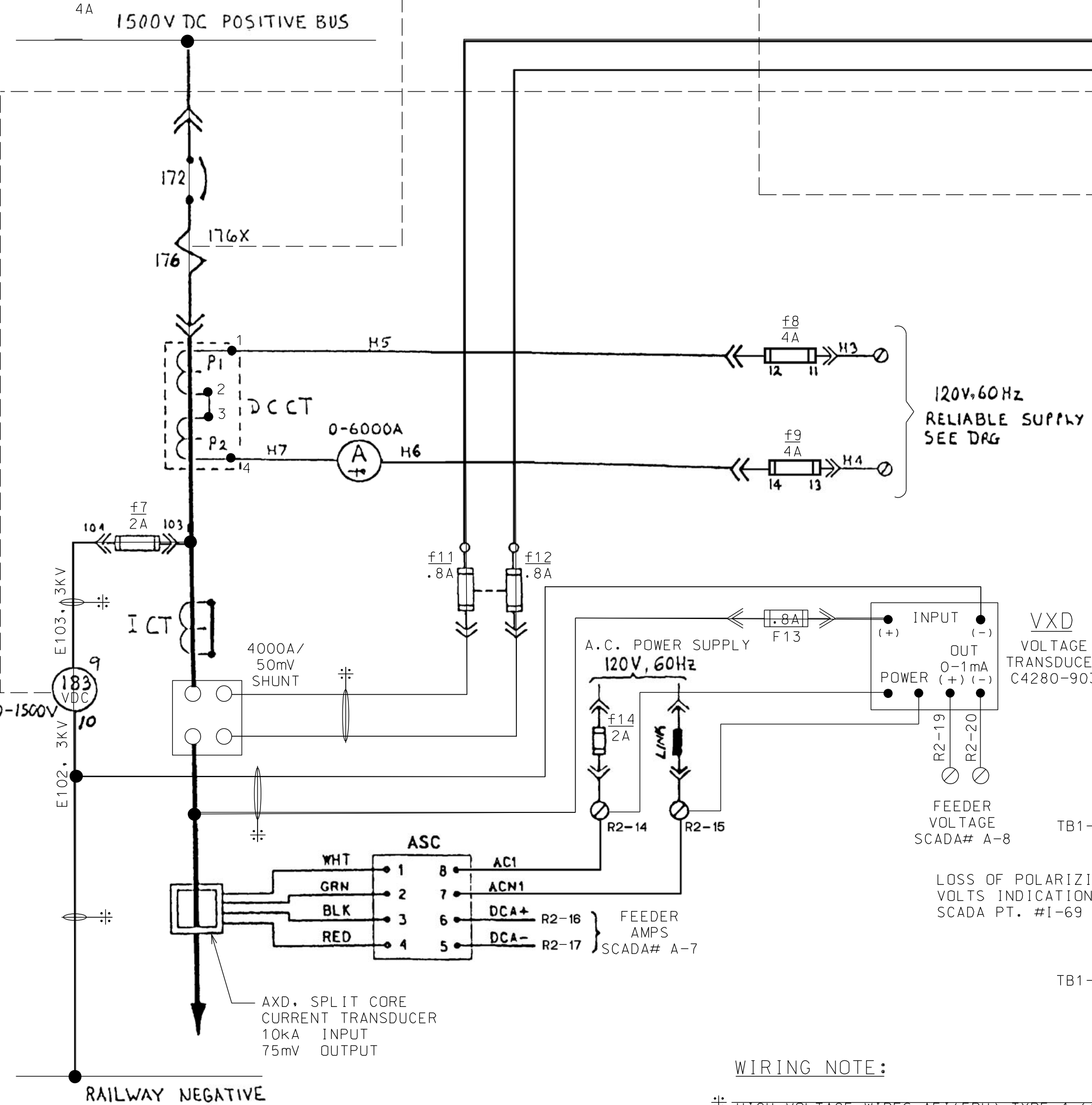
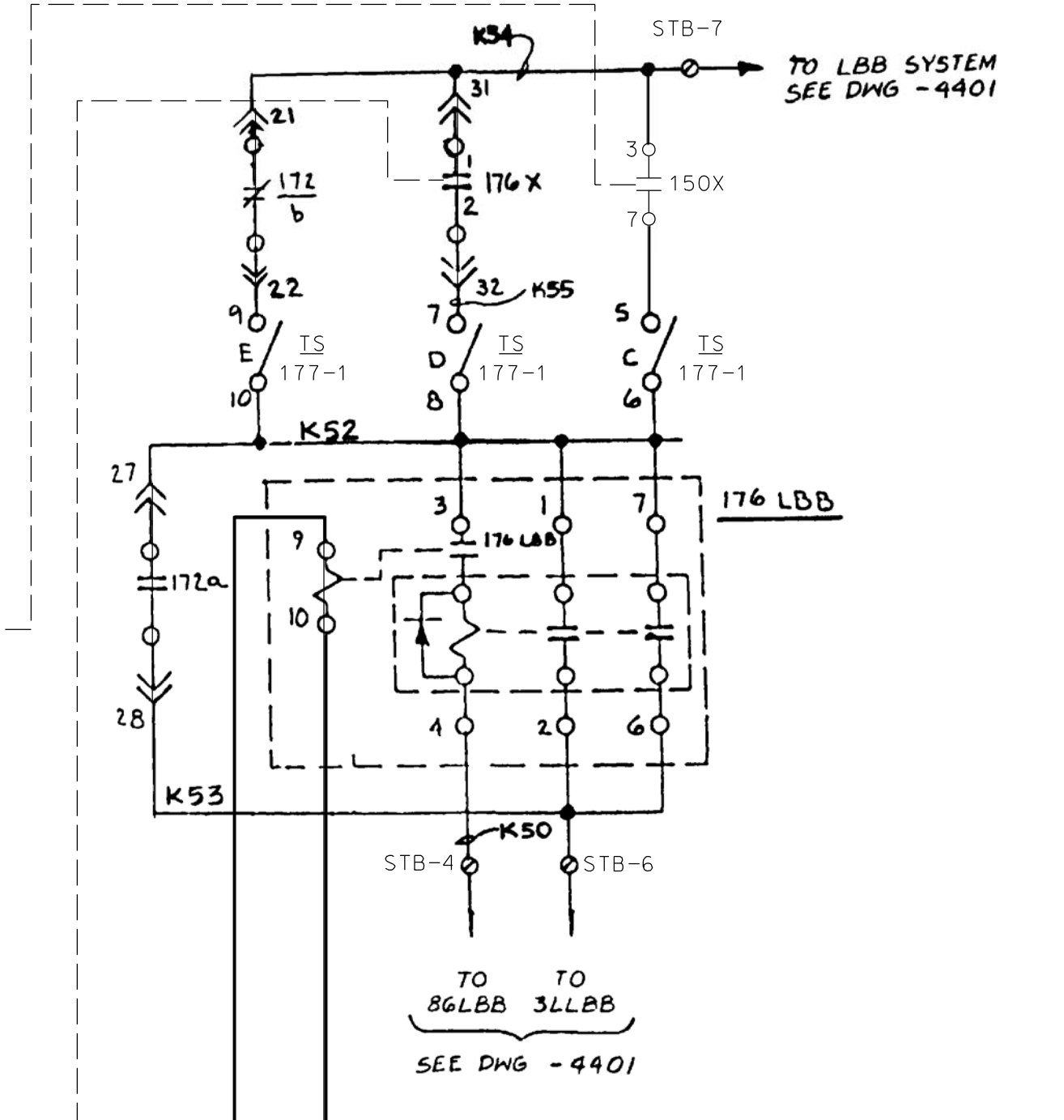
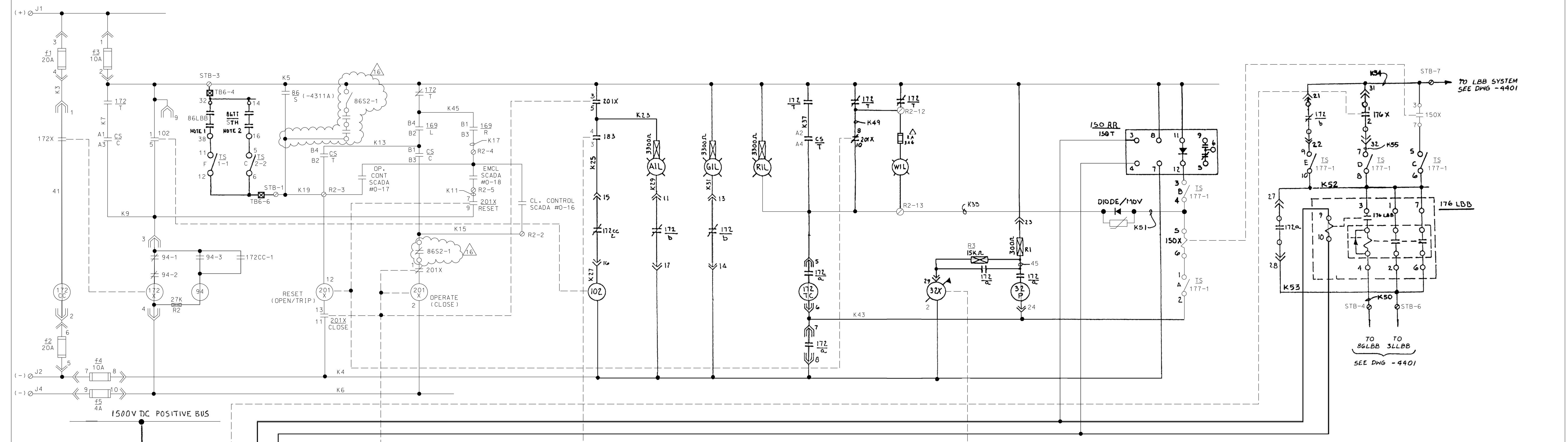
RIVERDALE TIE STATION
 MFG BY WHIPP & BOURNE LTD W & B DWG. NO 418766
 CAD FILE NO f/electrical/esl/riverdale/hyb/1306a.rxd

DESIGNED	DRAWN	CHECKED	APPROVED
-	AZ/CM	WPS	WPS

DISTRICT: METRA ELECTRIC
 DATE: 5/27/88
 SCALE: NONE
 PRINT NUMBER: SS-17.5-4306A

BY LDP

1	CHANGE	2	10-15-81	3	RH	4	2 N/O BKS AUX S1/S5 AND R3 ADDED TO POLARISING CIRCUIT	5	CT	6	WIRE #139 RE-MED CORNING OF 150Y NOW SHOWN	7	3-9-83	8	5-14-84	9	LAMP ADDED	10	ADD LBB ANNUNCIATOR TRANSFER TRIP	11	CP/WPS	12	WPS	13	GENERAL REVISION	14	11/05 WPS	15	9/09 WPS/RM	16	07/28/17 HS
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DEVICE LEGEND

- 30LBB LBB ANNUNCIATOR TARGET RELAY
- 32P POLARISING COIL FOR 176 TRIPPING 125VDC 2X50 OHM COILS
- 32X FLAG INDICATION RELAY FOR LOSS OF VOLTAGE
- 62TT TT TIMING RELAY 0.1 - 6.0 SEC.
- 64D GROUND FAULT SENSING RELAY
- 64XX AUX. RELAY FOR GROUND FAULT TRANSFER TRIP
- 86/S LOCKOUT RELAY
- 86LBB BREAKER BACKUP LOCKOUT RELAY (MANUAL RESET)
- 86TT TRANSFER TRIP LOCKOUT RELAY (ELECT. RESET)
- 94 CLOSING COIL CUT OFF (ANTI-PUMP) RELAY 125VDC
- 94TT TRANSFER TRIP OUTPUT RELAY
- 102 RECLOSING TIMER (SET AT 3.5 SECS.)
- 127 AC SUPPLY CHANGE OVER RELAY
- 150RR RATE OF RISE OVERCURRENT RELAY
- 150T TIME OVERCURRENT RELAY
- 150X AUXILIARY RELAY FOR LBB ON 150RR/150T
- 169 LOCAL - REMOTE SWITCH
- 172 D.C. FEEDER BREAKER
- 172a-b BREAKER OPEN-CLOSE STATUS SWITCH
- 172CC BREAKER CLOSING COIL 125VDC 1.8 OHM
- 172T BREAKER CARRIAGE POSITION SWITCH
- 172TC SHUNT TRIP COIL 125VDC 20 OHM
- 172X CLOSING COIL CONTACTOR 125VDC 650 OHM
- 176 MAGNETIC SERIES TRIP O/C DEVICE CAL. 3.5-4.5-6-7-8KA
- 176F O/C RELAY (0-6000A SCALE) 120V., 60HZ., HIGH SAT. POINT
- 176LBB LBB D.C. CURRENT SENSING RELAY
- 176TD O/C RELAY, TIMER 125VDC (SAT. AT 20SEC) IN CASE W/ 176F
- 176X AUXILIARY RELAY FOR MAGNETIC SERIES TRIP
- 183 VOLTAGE MEASURING TRANSFER RELAY
- 183X VOLTAGE MEASURING TRANSFER RELAY
- 201 TRANSFER TRIP RELAY
- 201D EMERGENCY CLOSE RELAY (REMOTE CONTACT)
- 201X BREAKER MASTER CONTROL RELAY (LATCHING TYPE)
- 294 SUPERVISORY TRIP RELAY (REMOTE CONTACT)
- 301TT CONTROL SWITCH FOR TRANSFER TRIP BY-PASS

DEVICE ABBREVIATIONS

- A AMMETER 0-6000A (0-2AFSD) RECT. MOVING COIL LONG SCALE
- AIL AMBER INDICATION LAMP- AUTO CLOSE IN OPERATION 125V
- C CLOSE
- CC CLOSING COIL
- CS CONTROL SWITCH TRIP- NEUTRAL- CLOSE
- DCCT D.C. CURRENT TRANSDUCER 3000/1A 120V, 60HZ
- DIRECTIONAL BLOCKING DIODE/METAL OXIDE VARISTOR
- GIL GREEN INDICATION LAMP- C.B. OPEN. 125V
- L LOCAL CONTROL MODE
- LBB LOCAL BREAKER BACKUP
- OP OPERATE
- R REMOTE CONTROL MODE
- RE RESET
- REI RED INDICATION LAMP- C.B. CLOSED. 125V
- RIL SWITCHBOARD D.C. SHUNT
- T TRIP
- T.S. TEST SWITCH
- TT TRANSFER TRIP
- V VOLTMETER (0-2000V) MOVING COIL, LONGSCALE DIRECT READING
- VR1 ATTENUATOR 200 OHM VARIABLE
- TEST LINK
- ASC D.C. CURRENT SIGNAL CONDITIONER
- AXD SPLIT CORE D.C. CURRENT TRANSDUCER
- XCA D.C. VOLTS TRANSDUCER CALIBRATOR
- VXD D.C. VOLTS TRANSDUCER
- WIL WHITE INDICATING LIGHT

CIRCUIT WITHIN THE CLOUD INDICATES NEW WORK UNDER THIS CONTRACT

REFERENCE DRAWINGS
 LBB SYSTEM SCHEMATIC DIAGRAM 55-175-4401
 TRANSFER TRIP SCHEMATIC DIAGRAM 55-175-4402

NOTES:
 SCHEMATIC DIAGRAM IS PRESENTED IN BREAKER OPEN AND IN SERVICE POSITION. ALL RELAYS DE-ENERGIZED.

BREAKER CONTACTS LEGEND:

- ⊙ MULTICORE TERMINATION
- BUS WIRING TB
- △ LOCATED IN SEPARATE ENCLOSURE
- ⊕ CARRIAGE SWITCH OPEN IN SERVICE
- ⊖ CARRIAGE SWITCH CLOSED IN SERVICE POSITION
- ⊕ AUX. SWITCH OPEN IN CB OPEN POSITION
- ⊖ AUX. SWITCH CLOSED IN CB OPEN POSITION
- ⊕ AUX. SWITCH OPEN IN CB CLOSED POSITION
- ⊖ AUX. SWITCH CLOSED IN CB CLOSED POSITION
- ⊕ MINOR DISCONNECT CONTACT CLOSED ONLY WHEN CIRCUIT BREAKER IS IN 'SERVICE' POSITION
- ⊖ MINOR DISCONNECT CONTACT CLOSED WHEN CIRCUIT BREAKER IS IN 'TEST' POSITION AND 'SERVICE' POSITION

LEGEND:

- ⊙ TERMINAL POINT AT 1500 V D.C. SWITCHGEAR
 - ⊙ TERMINAL POINT AT 12.4 KV A.C. SWITCHGEAR
 - ⊕ TERMINAL POINT AT 4 KV A.C. SWITCHGEAR
 - ⊖ TERMINAL POINT AT RECTIFIER CONTROL PANEL
 - △ TERMINAL POINT AT TRANSFORMER CONTROL PANEL
 - ⊕ TERMINAL POINT AT TRANSFER TRIP & LBB SWITCHBOARD
 - TERMINAL POINT AT SUPERVISORY CONTROL CABINET
 - ⊕ TERMINAL POINT AT BUS FAULT RELAY PANEL OR CONTROL SWITCHBOARD OR OTHER MISC. PANELS.
- LAST WIRE NO. K60

WIRING NOTE:

* HIGH VOLTAGE WIRES ALLEPH TYPE 4 (1900/3300V). THESE WIRES WILL BE SEGREGATED AND RUN SEPARATELY FROM OTHER WIRES.

BY LDP

1	CHARGE
2	10-15-15
3	RH
4	2 N/O BKS AUX S1/S5 N/O B3 ADDED TO POLARISING CIRCUIT
5	CT
6	WIRE #139 RE-MED CORING IN 150Y NOW SHOWN
7	3-9-83
8	5-14-84
9	L.N.P ADDED
10	ADD LBB AND TRANSFER TRIP
11	JAN 87 GENERAL REVISION
12	OCT 88 CP/WPS ISSUED FOR SCADA AS-BUILT
13	6/03 WPS
14	11/05 WPS
15	9/09 WPS/ RM
16	07/28/17 HS
	ISSUED FOR BID

Metra ENGINEERING DEPARTMENT
 CHICAGO, ILLINOIS

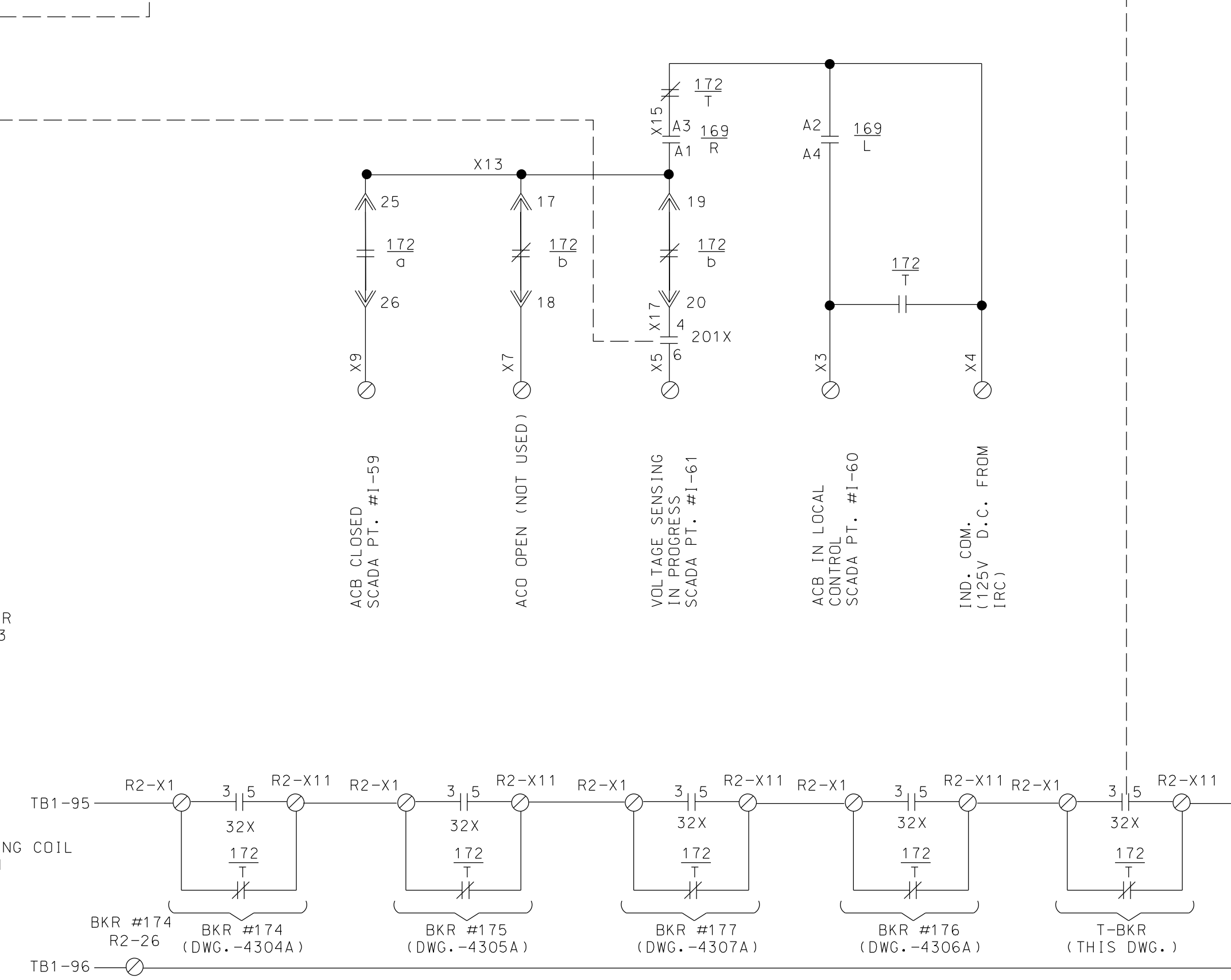
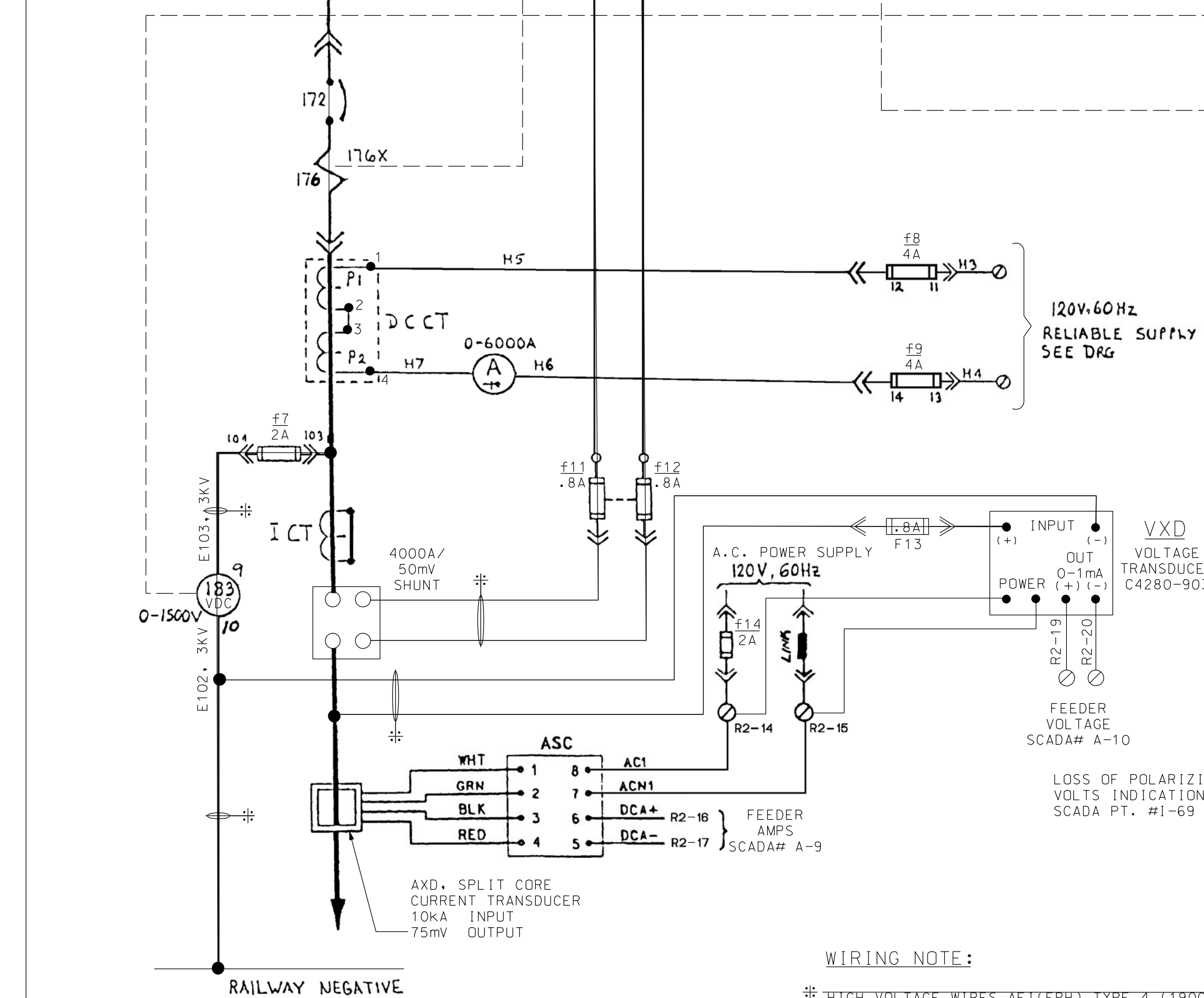
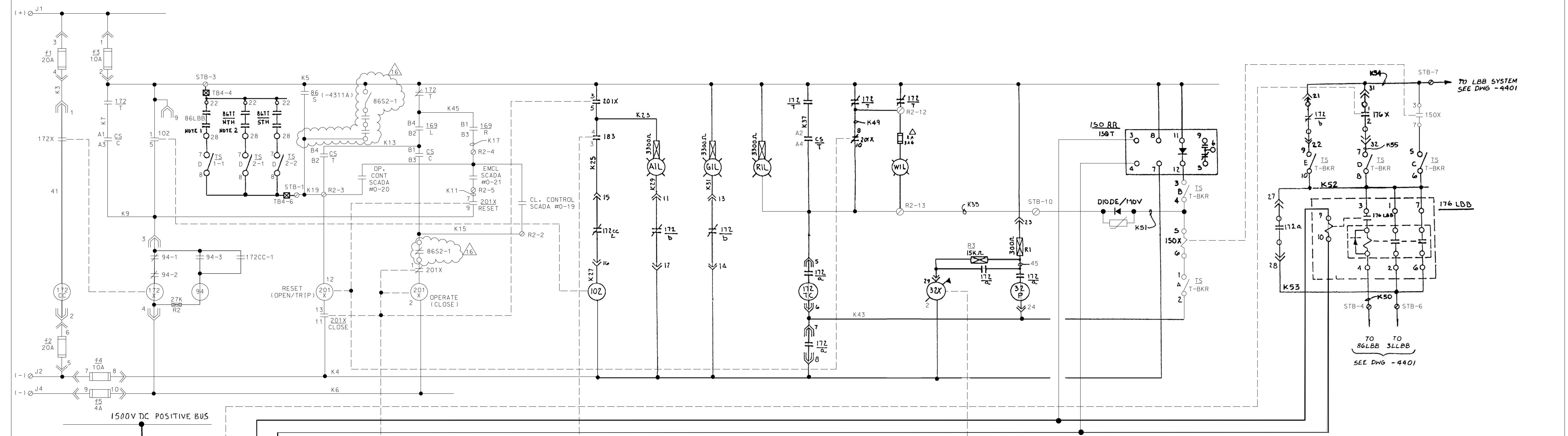
D.C. FEEDER BREAKER
 SECTION NO. 177
 SCHEMATIC DIAGRAM

RIVERDALE TIE STATION
 MFG BY WHIPP & BOURNE LTD W & B DWG. NO 418766

CAD FILE NO f/electrical/eal/riverdale/hyb/4307a.rxd

DESIGNED	DRAWN	CHECKED	APPROVED
-	AZ/CM	WPS	WPS

DIST NO	DATE	PRINT NUMBER
METRA ELECTRIC	5/27/18	SS-17.5-4307A



- DEVICE LEGEND**
- 30LBB 32P LBB ANNUNCIATOR TARGET RELAY
 - 62LBB 62TT TIMING RELAY 0.1 - 6.0 SEC.
 - 64D GROUND FAULT SENSING RELAY
 - 64XX AUX. RELAY FOR GROUND FAULT TRANSFER TRIP
 - 86/S LOCKOUT RELAY
 - 86LBB BREAKER BACKUP LOCKOUT RELAY (MANUAL RESET)
 - 86TT TRANSFER TRIP LOCKOUT RELAY (ELECT. RESET)
 - 94 CLOSING COIL CUT OFF (ANTI-PUMP) RELAY 125VDC
 - 94TT TRANSFER TRIP OUTPUT RELAY
 - 102 RECLOSING TIMER (SET AT 3.5 SECS.)
 - 127 AC SUPPLY CHANGE OVER RELAY
 - 150RR RATE OF RISE OVERCURRENT RELAY
 - 150T TIME OVERCURRENT RELAY
 - 150X AUXILIARY RELAY FOR LBB ON 150RR/150T
 - 169 LOCAL - REMOTE SWITCH
 - 172 D.C. FEEDER BREAKER
 - 172a-b BREAKER OPEN-CLOSE STATUS SWITCH
 - 172c BREAKER CLOSING COIL 125VDC 1.8 OHM
 - 172T BREAKER CARRIAGE POSITION SWITCH
 - 172TC SHUNT TRIP COIL 125VDC 20 OHM
 - 172X CLOSING COIL CONTACTOR 125VDC 650 OHM
 - 176 MAGNETIC SERIES TRIP O/C DEVICE
 - 176F CAL. 3.5-4-5-6-7-8KA O/C RELAY (0-6000A SCALE) 120V, 60HZ. HIGH SAT. POINT
 - 176LBB LBB D.C. CURRENT SENSING RELAY
 - 176TD O/C RELAY, TIMER 125VDC (SAT. AT 20SEC) IN CASE W/ 176F
 - 176X AUXILIARY RELAY FOR MAGNETIC SERIES TRIP
 - 183 VOLTAGE MEASURING TRANSFER RELAY
 - 201 SUPERVISORY CLOSE RELAY (REMOTE CONTACT)
 - 201D EMERGENCY CLOSE RELAY (REMOTE CONTACT)
 - 201X BREAKER MASTER CONTROL RELAY (LATCHING TYPE)
 - 294 SUPERVISORY TRIP RELAY (REMOTE CONTACT)
 - 301TT CONTROL SWITCH FOR TRANSFER TRIP BY-PASS
- DEVICE ABBREVIATIONS**
- A AMMETER 0-6000A (0-2AFSD) RECT. MOVING COIL LONG SCALE
 - AIL AMBER INDICATION LAMP- AUTO CLOSE IN OPERATION 125V
 - C CLOSE
 - CC CLOSING COIL
 - CS CONTROL SWITCH TRIP- NEUTRAL- CLOSE
 - DCCT D.C. CURRENT TRANSducer 3000/1A 120V, 60HZ
 - DIODE/MOV DIRECTIONAL BLOCKING DIODE/METAL OXIDE VARISTOR
 - GIL GREEN INDICATION LAMP- C.B. OPEN, 125V
 - L LOCAL CONTROL MODE
 - LB LOCAL BREAKER BACKUP
 - OP OPERATE
 - R REMOTE CONTROL MODE
 - RE RESET
 - REI RED INDICATION LAMP- C.B. CLOSED, 125V
 - RIL SWITCHBOARD D.C. SHUNT
 - T TRIP
 - T.S. TEST SWITCH
 - TT TRANSFER TRIP
 - V VOLTMETER (0-2000V) MOVING COIL, LONGSCALE DIRECT READING
 - VR1 ATTENUATOR 200 OHM VARIABLE
 - T-L TEST LINK
 - ASC D.C. CURRENT SIGNAL CONDITIONER
 - AXD SPLIT CORE D.C. CURRENT TRANSducer
 - XCA D.C. VOLTS TRANSducer CALIBRATOR
 - VXD D.C. VOLTS TRANSducer
 - WIL WHITE INDICATING LIGHT

CIRCUIT WITHIN THE CLOUD INDICATES NEW WORK UNDER THIS CONTRACT

WIRING NOTE:
 * HIGH VOLTAGE WIRES ARE (EPH) TYPE 4 (1900/3300V). THESE WIRES WILL BE SEGREGATED AND RUN SEPARATELY FROM OTHER WIRES.

- BREAKER CONTACTS LEGEND:**
- ⊗ MULTICORE TERMINATION
 - BUS WIRING TB
 - △ LOCATED IN SEPARATE ENCLOSURE
 - ⊕ CARRIAGE SWITCH OPEN IN SERVICE
 - ⊖ CARRIAGE SWITCH CLOSED IN SERVICE POSITION
 - ⊕ AUX. SWITCH OPEN IN CB OPEN POSITION
 - ⊖ AUX. SWITCH CLOSED IN CB CLOSED POSITION
 - ⊕ AUX. SWITCH OPEN IN CB OPEN POSITION
 - ⊖ AUX. SWITCH CLOSED IN CB CLOSED POSITION
 - ⊕ MINOR DISCONNECT CONTACT CLOSED ONLY WHEN CIRCUIT BREAKER IS IN 'SERVICE' POSITION
 - ⊖ MINOR DISCONNECT CONTACT CLOSED WHEN CIRCUIT BREAKER IS IN 'TEST' POSITION AND 'SERVICE' POSITION

- LEGEND:**
- ⊗ TERMINAL POINT AT 1500 V D.C. SWITCHGEAR
 - ⊕ TERMINAL POINT AT 12.4 KV A.C. SWITCHGEAR
 - ⊖ TERMINAL POINT AT 4 KV A.C. SWITCHGEAR
 - ⊕ TERMINAL POINT AT RECTIFIER CONTROL PANEL
 - ⊖ TERMINAL POINT AT TRANSFORMER CONTROL PANEL
 - ⊕ TERMINAL POINT AT TRANSFER TRIP & LBB SWITCHBOARD
 - TERMINAL POINT AT SUPERVISORY CONTROL CABINET
 - ⊖ TERMINAL POINT AT BUS FAULT RELAY PANEL OR CONTROL SWITCHBOARD OR OTHER MISC. PANELS.
- LAST WIRE NO. K60

REFERENCE DRAWINGS
 LBB SYSTEM SCHEMATIC DIAGRAM 55-175-4401
 TRANSFER TRIP SCHEMATIC DIAGRAM 55-175-4402

Metra ENGINEERING DEPARTMENT
 CHICAGO, ILLINOIS

D.C. FEEDER BREAKER
 SECTION NO. T-BKR
 SCHEMATIC DIAGRAM

RIVERDALE TIE STATION
 MFG BY WHIPP & BOURNE LTD W & B DWG. NO 418766
 CAD FILE NO f/electrical/eam/riverdale/hyb/1308a.rvt

DESIGNED	DRAWN	CHECKED	APPROVED
-	AZ/CM	WPS	WPS

DISTRICT: METRA ELECTRIC

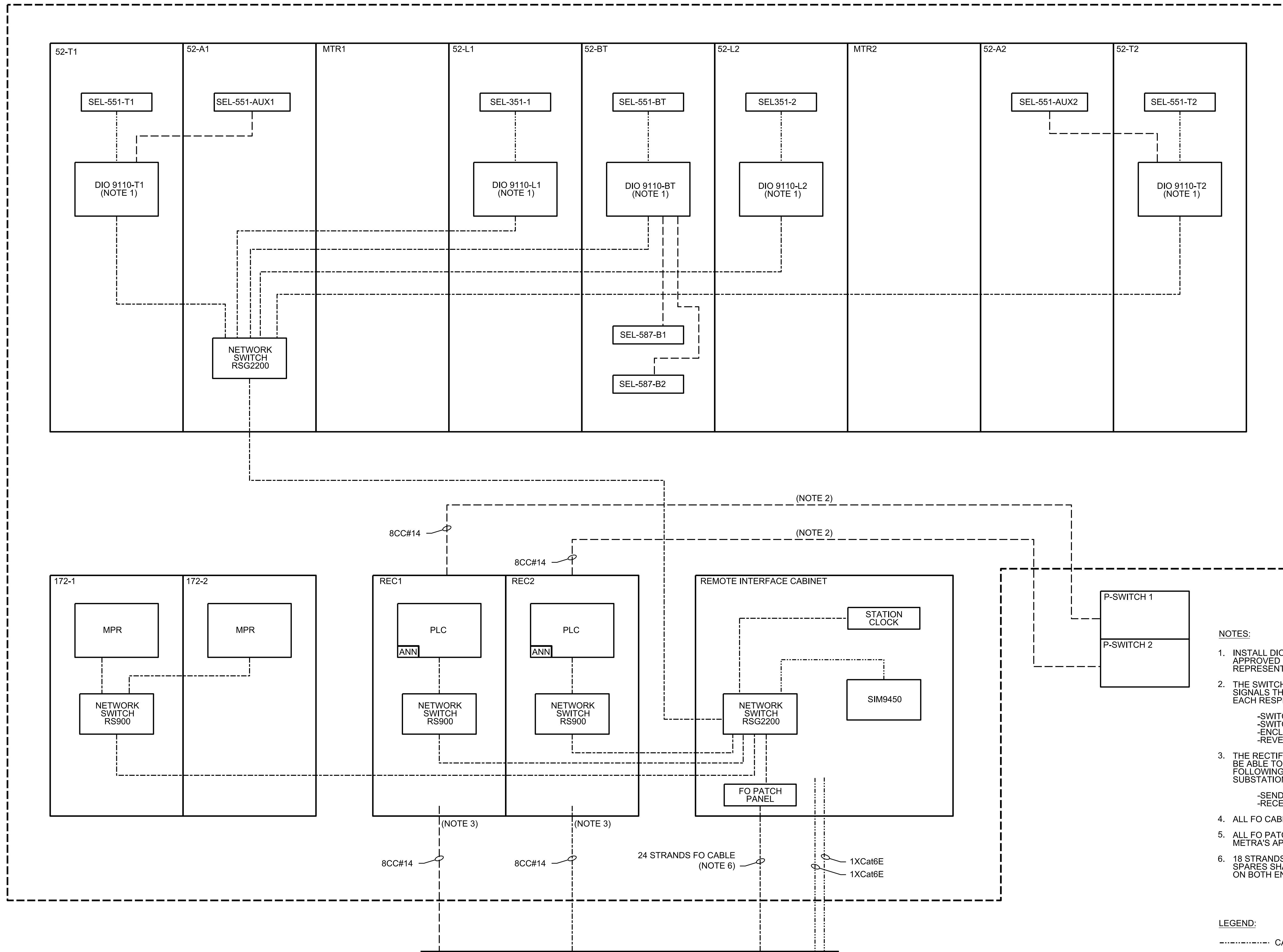
DATE: 5/17/18
 SCALE: NONE

PRINT NUMBER: SS-17.5-4308A

BY LDP

1	CHANGE	2	10/15/18	3	R.H.	4	2 N/O BKS AUX S/75 N/D R3 ADDED TO POLARISING CIRCUIT	5	CT	6	WIRE N° K39 RE-USED CORNING INTEGRITY 150V NOW SHOWN	7	3-9-83	8	5-14-84	9	L.A.I.P ADDED	10	ADD LBB ANN TRANSFER TRIP	11	JAN 97	12	GENERAL REVISION	13	WPS	14	11/05	15	9/09	16	07/28/17	17	ISSUED FOR BID
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NEW PREFABRICATED SUBSTATION



NOTES:

- INSTALL DIO MODULES AS NEEDED AND AS APPROVED BY METRA'S AUTHORIZED REPRESENTATIVE.
- THE SWITCH SHALL SEND THE FOLLOWING SIGNALS THROUGH DRY CONTACTS TO EACH RESPECTIVE CONTROL CABINET:
 - SWITCH OPENED
 - SWITCH CLOSED
 - ENCLOSURE DOOR OPEN
 - REVERSE CURRENT
- THE RECTIFIER CONTROL CABINET SHALL BE ABLE TO SEND/RECEIVE THE FOLLOWING SIGNALS TO THE EXISTING SUBSTATION:
 - SEND TRIP DC LOCKOUT
 - RECEIVE TRIP FROM 64HS
- ALL FO CABLES USED SHALL BE MULTIMODE.
- ALL FO PATCH PANELS SHALL BE SUBJECT TO METRA'S APPROVAL.
- 18 STRANDS SHALL BE KEPT AS SPARES. ALL SPARES SHALL BE PROPERLY TERMINATED ON BOTH ENDS FOR FUTURE USE.

LEGEND:

- CAT 6E
- FO CABLE
- HARDWIRED

CONTINUED ON SHEET 2

PRINTED ON: SDATES

REV	DATE	BY	APP	DESCRIPTION	REV	DATE	BY	APP	DESCRIPTION
0	7/28/2017	AA	ER	ISSUED FOR BID					

SUB CONSULTANT

PRIMARY CONSULTANT
SEAL/ SIGNATURE

PRIMARY CONSULTANT
LTK Engineering Services

DESIGNED: A. ACHHAMMER
DRAWN: N. DIAZ
CHECKED: E. ROWE
METRA P.M. R. CERANT
DATE: JUNE 12, 2017

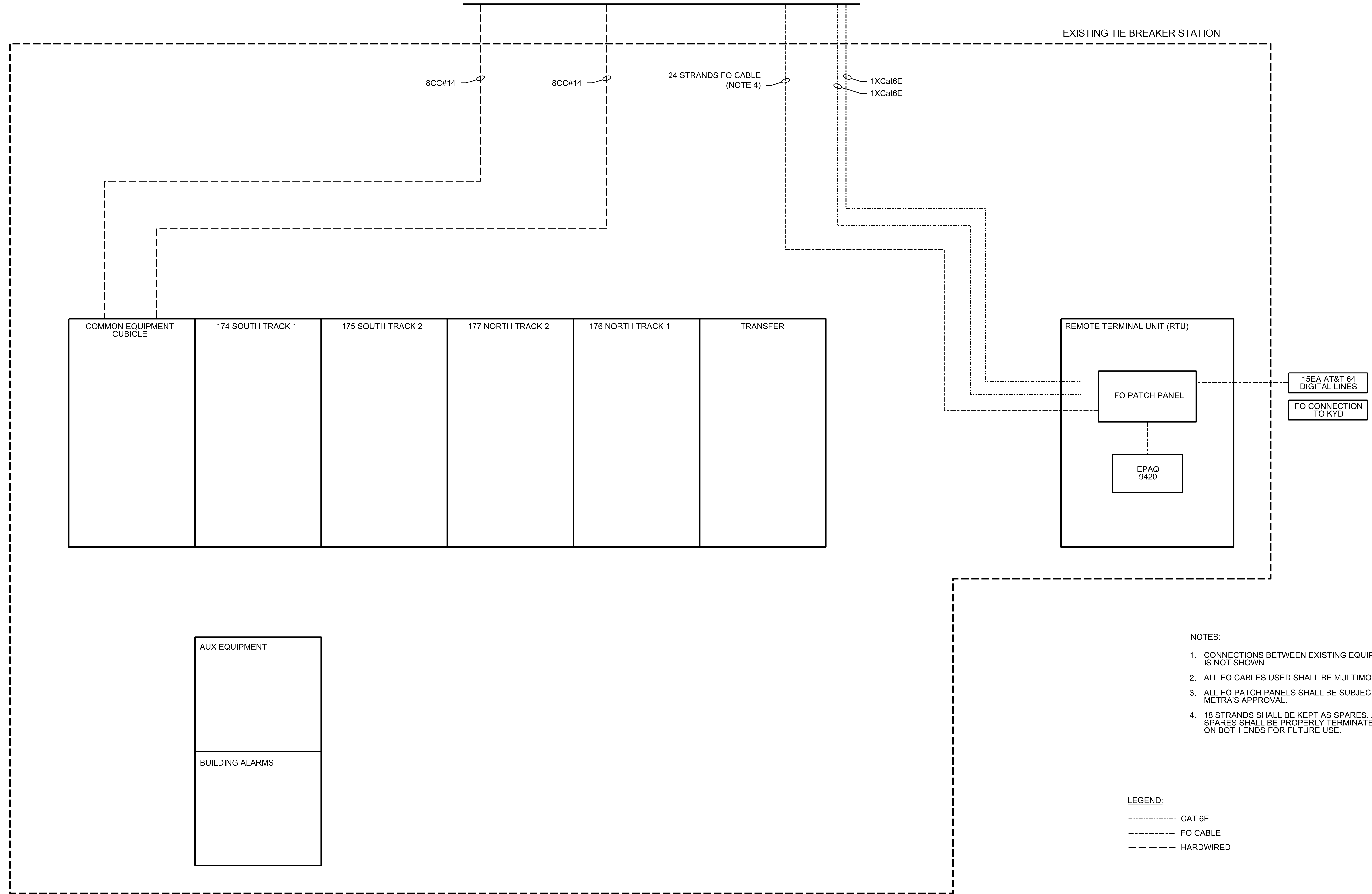
Metra
ENGINEERING DEPARTMENT
547 W. JACKSON BOULEVARD
CHICAGO, ILLINOIS 60661

LOCATION NAME:
RIVERDALE SUBSTATION
TITLE:
**STATION CONTROL ARCHITECTURE
EXISTING BUILDING AND INTERFACES
SHEET 1 OF 2**

CAD FILE NUMBER:
SFILESS
SCALE:
NTS
PROJECT NO.
GW4254-57102002
MILE POST NO.
17.5
DISTRICT:
MED
SHEET NO.
SS-17.5-5000

CONTINUED ON SHEET 1

EXISTING TIE BREAKER STATION



NOTES:

1. CONNECTIONS BETWEEN EXISTING EQUIPMENT IS NOT SHOWN
2. ALL FO CABLES USED SHALL BE MULTIMODE.
3. ALL FO PATCH PANELS SHALL BE SUBJECT TO METRA'S APPROVAL.
4. 18 STRANDS SHALL BE KEPT AS SPARES. ALL SPARES SHALL BE PROPERLY TERMINATED ON BOTH ENDS FOR FUTURE USE.

LEGEND:


- CAT 6E
- FO CABLE
- HARDWIRED

PRINTED ON: SDATES

REV	DATE	BY	APP	DESCRIPTION	REV	DATE	BY	APP	DESCRIPTION
0	7/28/2017	AA	ER	ISSUED FOR BID					

SUB CONSULTANT

PRIMARY CONSULTANT
SEAL/ SIGNATURE



PRIMARY CONSULTANT



DESIGNED: A. ACHHAMMER
DRAWN: N. DIAZ
CHECKED: E. ROWE
METRA P.M., R. CERANT
DATE: JUNE 12, 2017



ENGINEERING DEPARTMENT
547 W. JACKSON BOULEVARD
CHICAGO, ILLINOIS 60661

LOCATION NAME:
RIVERDALE SUBSTATION

TITLE:
**STATION CONTROL ARCHITECTURE
EXISTING BUILDING AND INTERFACES
SHEET 2 OF 2**

CAD FILE NUMBER:
\$FILES\$

SCALE:
NTS

PROJECT NO.
GW4254-57102002

MILE POST NO.
17.5

DISTRICT:
MED

SHEET NO.
SS-17.5-5001