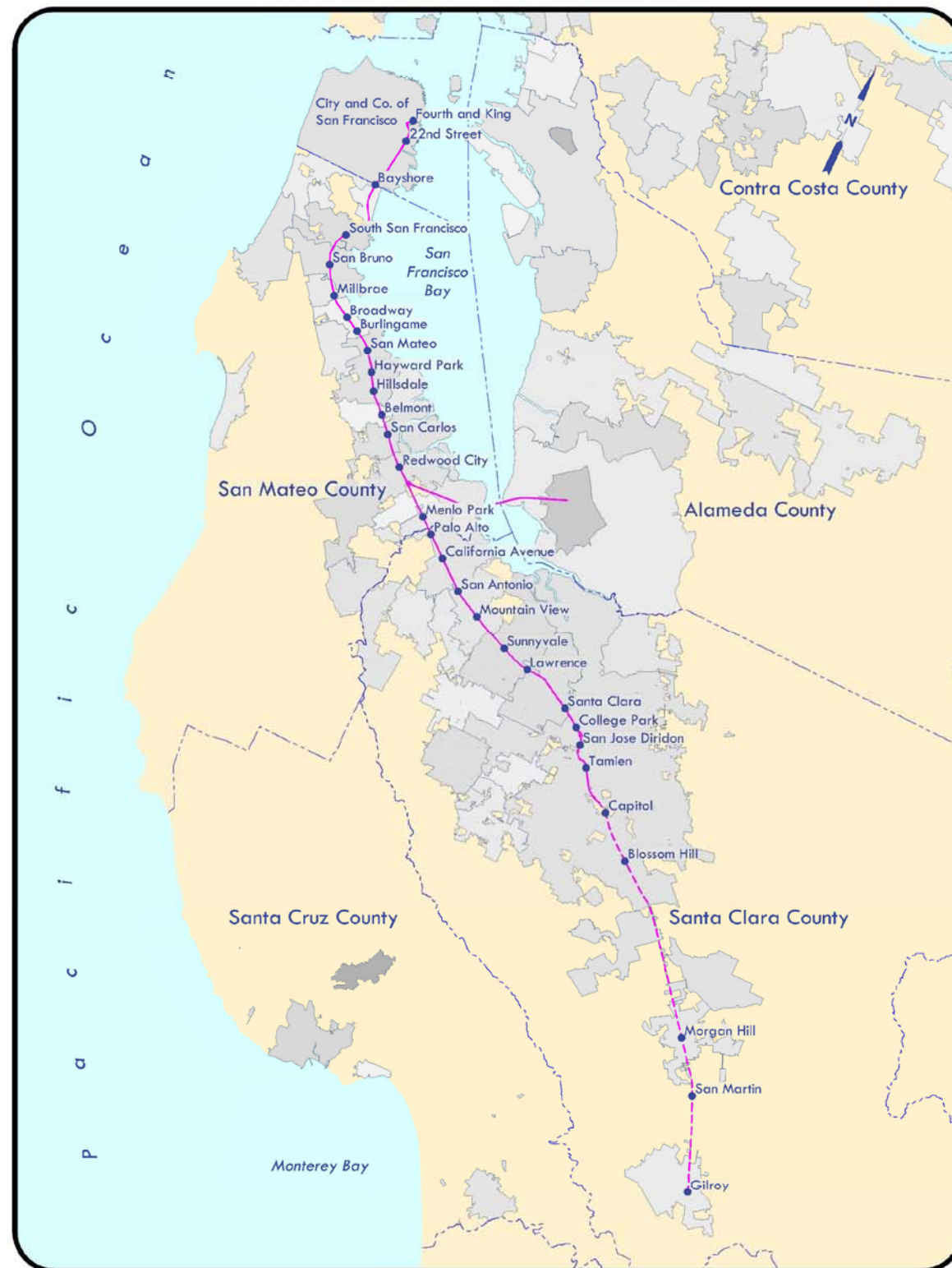


CALTRAIN CORRIDOR



ELECTRIFICATION STANDARD DRAWINGS

PENINSULA CORRIDOR JOINT POWERS BOARD

OVERHEAD CONTACT SYSTEM BASIC DESIGN: GROUNDING AND BONDING

JANUARY 1, 2024

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








STANDARD DRAWINGS	
ELECTRIFICATION PROJECT GROUNDING & BONDING BASIC DESIGN DRAWING INDEX	

<small>CADD FILE NAME:</small> E5001	
<small>REV:</small>	<small>EDITION:</small> 01012024
<small>STANDARD DRAWING NO.:</small> E5001	





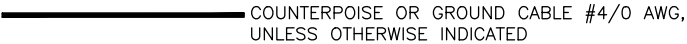
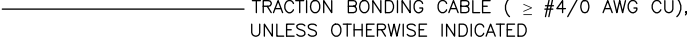


ABBREVIATIONS

ACSR	ALUMINUM CONDUCTOR STEEL REINFORCED CABLE
ATF	AUTOTRANSFORMER FEEDER
ATFZ	AUTOTRANSFORMER FEEDER ZONE
AVE	AVENUE
AWG	AMERICAN WIRE GAUGE
CCZ	CURRENT COLLECTOR ZONE
CL	CABLE LENGTH
CEMOF	CALTRAIN CENTRALIZED EQUIPMENT MAINTENANCE AND OPERATION FACILITY
CONC	CONCRETE
CP	COUNTERPOISE
CU	COPPER
CW	CONTACT WIRE
DWG. NO.	DRAWING NUMBER
EW	EXOTHERMIC WELD
EXIST	EXISTING
EGC	EQUIPMENT GROUNDING CONDUCTOR
FDN	FOUNDATION
FG	FINISHED / FINAL GRADE
HP	HIGHEST POINT OF CONTACT WIRE
LV	LOW VOLTAGE (120V NOMINAL VOLTAGE)
MF	MAINTENANCE FACILITY
MGB	MAIN GROUNDING BUS BAR
MV	MEDIUM VOLTAGE
MW	MESSANGER WIRE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NTS	NOT TO SCALE
OCLZ	OVERHEAD CONTACT LINE ZONE
OCS	OVERHEAD CONTACT SYSTEM
PS	PARALLELING STATION
ROW	RIGHT OF WAY
SD	STANDARD DRAWING
SPD	SURGE PROTECTION DEVICE
SRG	SIGNAL REFERENCE GROUND
SW	STATIC WIRE
SWS	SWITCHING STATION
THHN	THERMOPLASTIC, HIGH HEAT, NYLON INSULATION
TPS	TRACTION POWER SUBSTATION
TVM	TICKET VENDING MACHINE
VLD	VOLTAGE LIMITING DEVICE
VMS	VISUAL MESSAGE SIGN
WWM	WELDED WIRE MESH

SYMBOLS



	PASSENGER SHELTER
	OCS POLE
	VISUAL MESSAGE SIGN
	LIGHT POLE
	GROUND
	CENTER LINE
	GROUND ROD
	CABLE CONNECTION/JOINT
	DRAIN BOND OR IMPEDANCE BOND

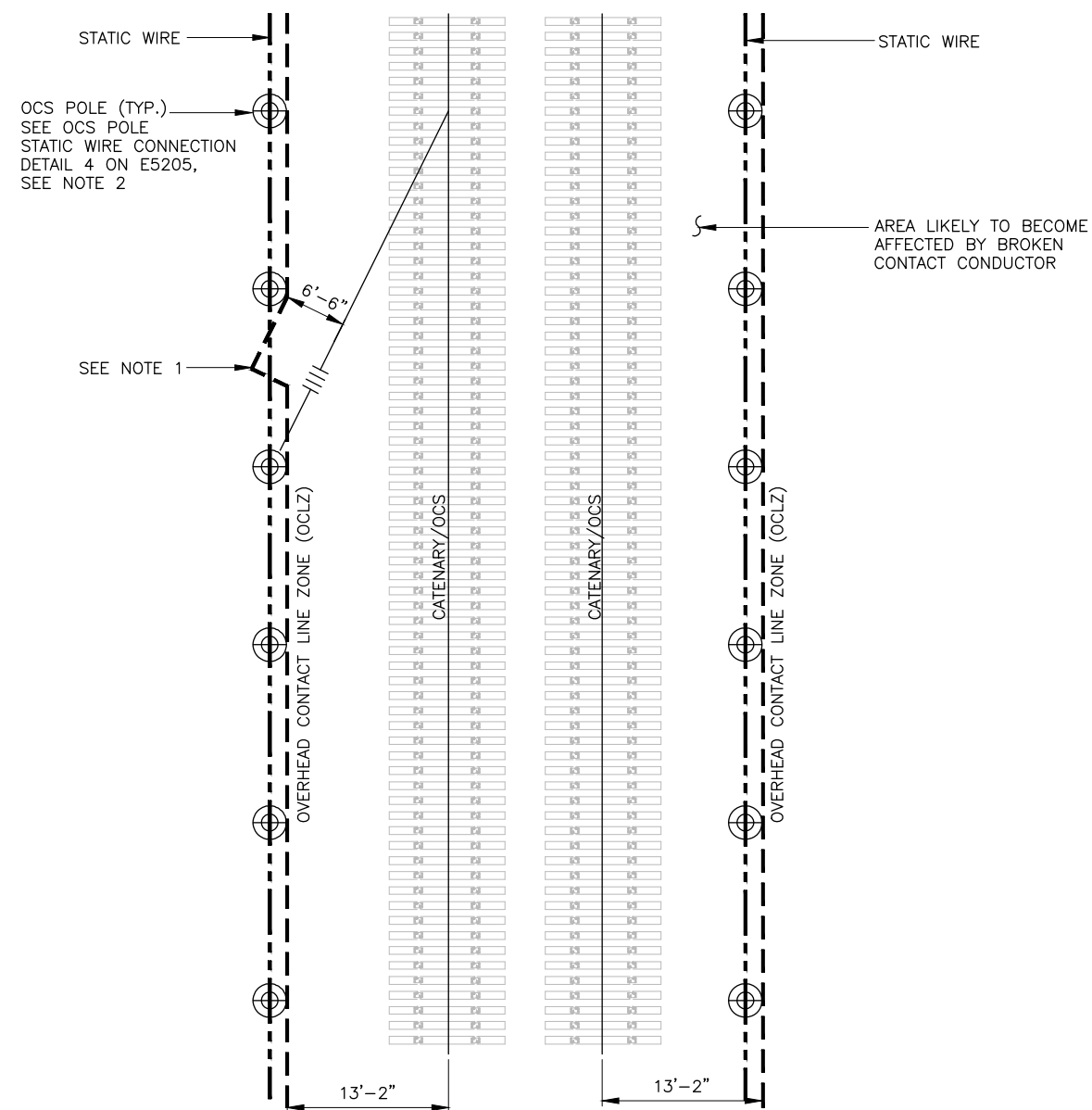
LINESTYLES

	CENTERLINE
	METALLIC RIGHT-OF-WAY FENCE (BY OTHERS)
	INTERTRACK FENCE WELDED WIRE MESH (WWM) (BY OTHERS)
	OVERHEAD CONTACT LINE ZONE (OCLZ)
	COUNTERPOISE OR GROUND CABLE #4/0 AWG, UNLESS OTHERWISE INDICATED
	TRACTION BONDING CABLE (\geq #4/0 AWG CU), UNLESS OTHERWISE INDICATED
	AUTOTRANSFORMER FEEDER (ATF) (BY OTHERS)
	STATIC WIRE ACSR (BY OTHERS)

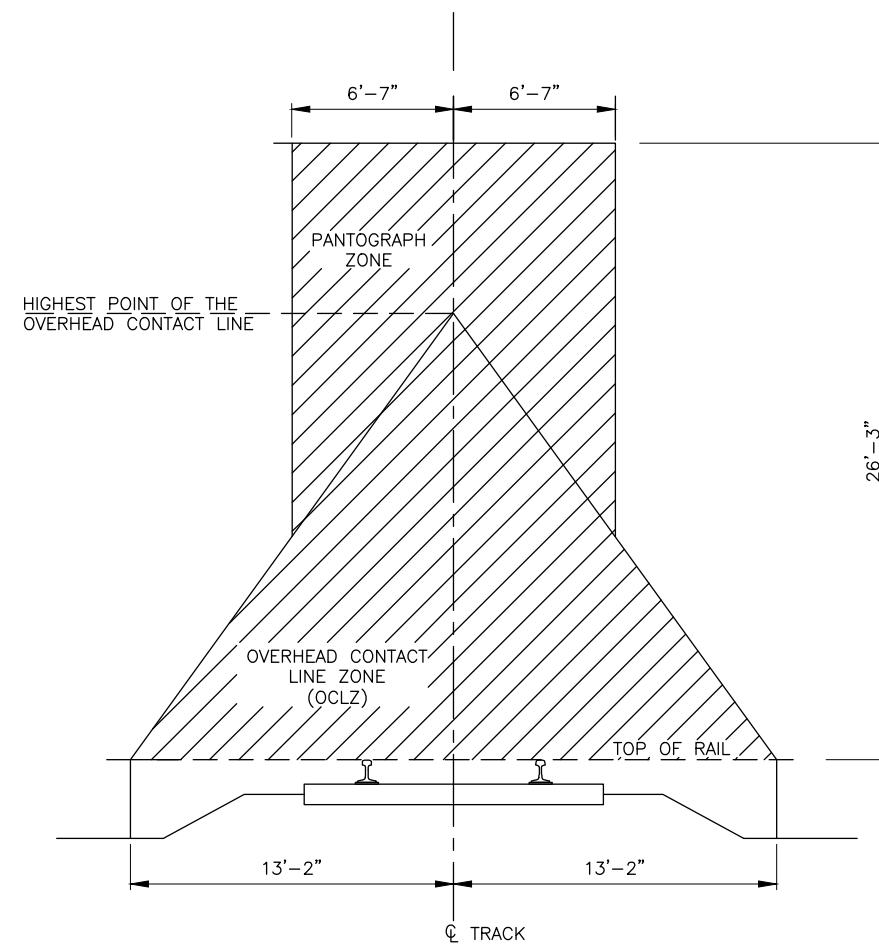
GENERAL NOTES:

1. THIS PACKAGE IS THE STANDARD DESIGN FOR GROUNDING AND BONDING AND DOES NOT APPLY TO NEUTRAL RETURN SYSTEM.
2. FOR SYSTEMWIDE GROUNDING AND BONDING SPECIFICATIONS REFER TO SPECIFICATION 26 05 26.
3. THE STANDARD GROUNDING AND BONDING DESIGN OF THE FOLLOWING IS NOT IN THE SCOPE OF THIS SET:
 - A. GENERAL FACILITY GROUNDING
 - B. LIGHTNING PROTECTION AND SURGE ARRESTERS
 - C. GROUNDING AND BONDING PROTECTION SYSTEMS FOR THE COMMUNICATIONS SYSTEM EQUIPMENT AND STRUCTURES
 - D. GROUNDING AND BONDING REQUIREMENTS FOR FACILITY POWER SYSTEMS AND LIGHTING SYSTEMS
 - E. GROUNDING REQUIREMENTS FOR RACEWAY, CABLE TRAY, UNDERGROUND DUCTBANKS, AND STRUCTURES
 - F. GROUNDING AND BONDING REQUIREMENTS FOR UTILITIES
 - G. GROUNDING DESIGN OF FACILITIES/BUILDINGS, RAISED FLOOR SYSTEMS, EQUIPMENT ROOM AND PRE-ENGINEERED ENCLOSURE SUCH AS: TRACTION POWER FACILITY (TPF) EQUIPMENT HOUSES, COMMUNICATIONS ROOMS, CBSS/PTC /SIGNAL HOUSES, AND WAYSIDE POWER CONTROL CUBICLES.
 - H. STRAY CURRENT, CORROSION CONTROL, AND EMI.
4. REFER TO OTHER DISCIPLINES FOR THE FOLLOWING:
 - A. FOR BRIDGE STRUCTURE PLAN AND ELEVATION BACKGROUNDS.
 - B. OCS BACKGROUNDS FOR STATIC WIRE, CONTACT WIRE, AUTOTRANSFORMER FEEDER WIRE, MESSANGER WIRE.
 - C. STATION BACKGROUNDS FOR THE EXTENT OF PLATFORM WHICH DETERMINES THE EXTENT OF COUNTERPOISE WIRE.
5. FOR ALL DRAWINGS: STATIC WIRE, ELECTRIFIED WIRE, OCS POLE AND SUPPORT, PROTECTION BARRIER, BRIDGE STRUCTURE LAYOUT, SECTION AND ELEVATION PLAN, STATION AND PLATFORM PLAN, ARE PROVIDED AS BACKGROUND BY OTHERS (SEE NOTE 4 ABOVE), AND ARE FOR REFERENCE ONLY; APPLY PROJECT SPECIFIC BACKGROUND FOR OCS, BRIDGE STRUCTURE, STATION PLATFORM, AND SIGNALS.
6. FOR THIRD PARTY UTILITY GROUNDING AND BONDING,
 - A. CONTRACTOR SHALL IDENTIFY ALL THIRD PARTY METALLIC FENCES, THIRD PARTY PIPELINES, THIRD PARTY STRUCTURES, AND THIRD PARTY PURPOSELY ELECTRIFIED FENCES.
 - B. FOR REQUIREMENTS, SEE NOTES 8 AND 9 ON DRAWING E5011.
 - C. CONTRACTOR SHALL SUBMIT THE DESIGN, PRIOR TO INSTALLATION, TO THE ENGINEER FOR APPROVAL.
7. CONDUCTORS USED FOR GROUNDING AND BONDING SHALL BE 4/0 AWG COPPER, ANNEALED AND SOFT DRAWN, OR APPROVED EQUAL. IN EASILY ACCESSIBLE AREAS, THE CONDUCTOR SHALL BE ERICO OR ANTITHEFT EQUAL APPROVED, WITH EQUIVALENT ELECTRICAL PROPERTIES.
8. BONDING TO PRESTRESSED STEEL TENDONS, WITHIN STRUCTURES, IS PROHIBITED.
9. FOR THE PURPOSE OF CALTRAIN ELECTRIFICATION STANDARD DRAWINGS, THE FOLLOWING NOMENCLATURE IS USED:
 - A) A BARE CONDUCTOR, ALSO REFERRED TO AS WIRE, IS A METALLIC CONDUCTOR WITHOUT INSULATION OR COVERING.
 - B) A CABLE IS A METALLIC CONDUCTOR WITH INSULATION OR COVERING.

01012024 EDITION										PENINSULA CORRIDOR JOINT POWERS BOARD			STANDARD DRAWINGS			CADD FILE NAME: E5002			
										APPROVED BY:  DEPUTY DIRECTOR, ENGINEERING						ELECTION PROJECT GROUNDING & BONDING BASIC DESIGN ABBREVIATIONS, SYMBOLS, GENERAL NOTES AND ASSUMPTIONS		REV:	EDITION: 01012024
										1250 San Carlos Avenue San Carlos, CA 94070			STANDARD DRAWING NO.: E5002						
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1
OVERHEAD CONTACT LINE ZONE—PLAN VIEW
NOT TO SCALE



2
OVERHEAD CONTACT LINE ZONE AND PANTOGRAPH ZONE
NOT TO SCALE

NOTES:

1. THE OCLZ IS EXTENDED Laterally TO A DISTANCE OF 6'-6" FROM OUTERMOST LIVE TERMINATION WIRE.
2. FOR OCLZ GROUNDING DETAILS TO THE NEAREST OCS POLE, AND GROUNDING LOCATIONS OF SIGNAL ELEMENTS, INCLUDING CROSS BONDS GROUNDING WITHIN OCLZ, REFER TO SIGNALS AND COMMUNICATIONS DUCTBANK.

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PENINSULA CORRIDOR JOINT POWERS BOARD

APPROVED BY:

Bin Zhang

DEPUTY DIRECTOR, ENGINEERING



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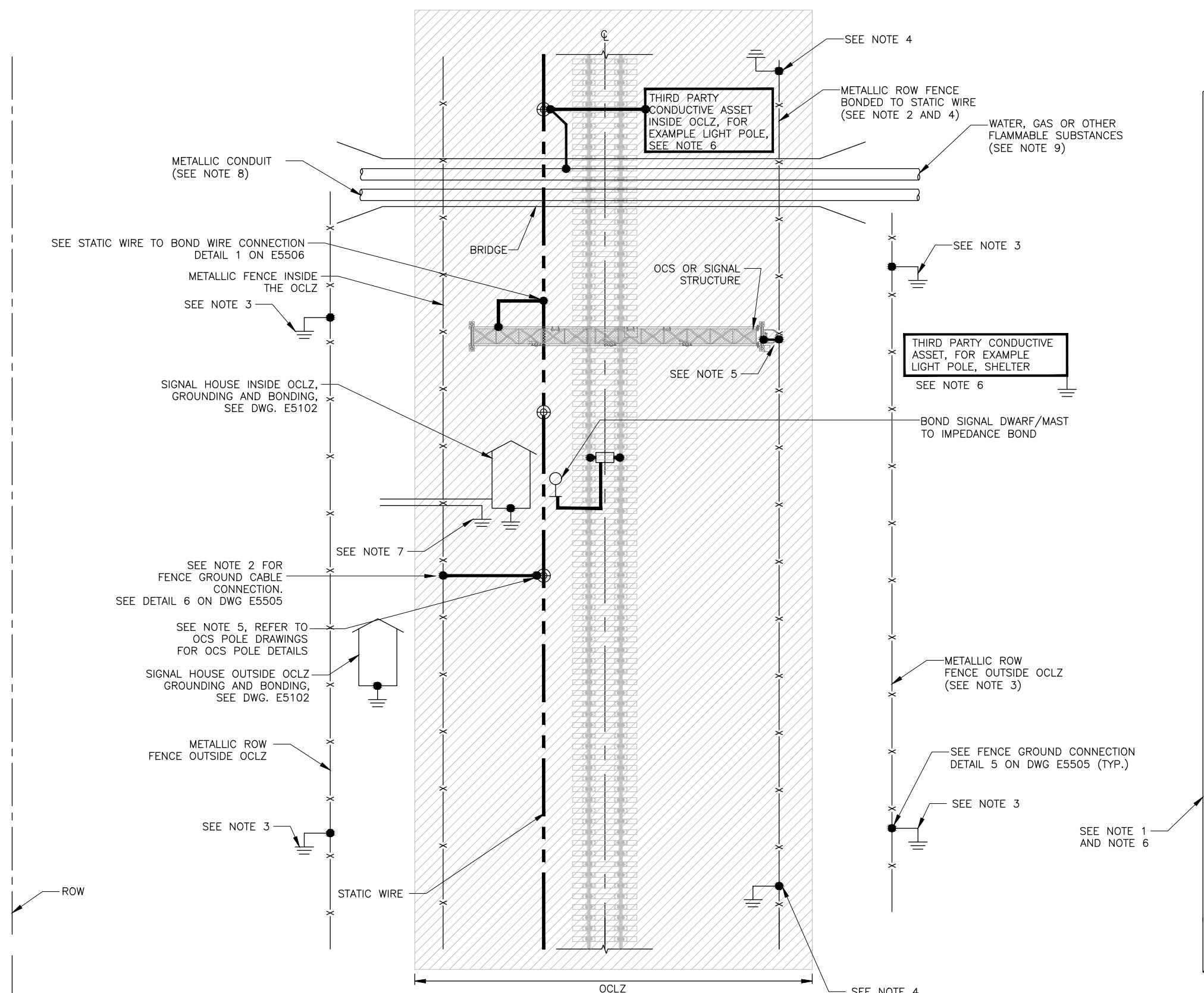
STANDARD DRAWINGS

ELECTRIFICATION PROJECT
GROUNDING & BONDING BASIC DESIGN
OVERHEAD CONTACT LINE ZONE

CADD FILE NAME:
E5010

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STANDARD DRAWING NO.:
E5010



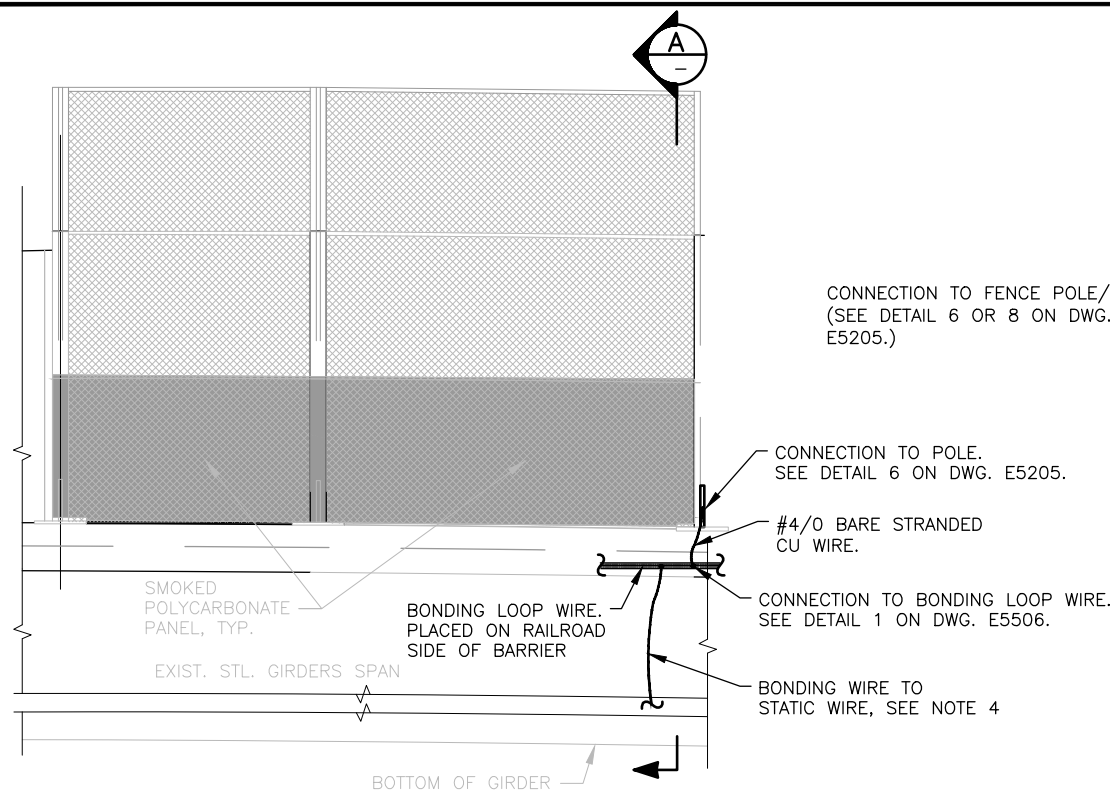
- NOTES:**
- FOR EXPOSED METAL PIPE AND/OR CONDUIT NO MORE THAN 45' FROM TRACK, SEE NOTE 6.
 - METALLIC RIGHT-OF-WAY FENCE LESS THAN 1000FT LONG AND INSIDE THE OCLZ SHALL BE BONDED TO THE STATIC WIRE OR COUNTERPOISE WIRE. IF THE FENCE EXCEEDS 1000FT IN LENGTH IT SHALL BE DIVIDED INTO MAXIMUM 1000FT SECTIONS WITH INSULATED INSERTS. SEE INSULATED FENCE INSERTS DETAIL 1 ON DWG E5508.
 - METALLIC RIGHT-OF-WAY FENCE OUTSIDE THE OCLZ AND LESS THAN 45' FROM CENTERLINE OF TRACK SHALL BE GROUNDED IN ACCORDANCE WITH NFPA 70. GROUND RODS SHALL BE SPACED AT MAXIMUM 500FT INTERVALS.
 - FOR FENCE, DISTANCE BETWEEN GROUNDS, WHETHER STATIC WIRE/COUNTERPOISE CONNECTION OR EARTH, SHALL NOT EXCEED 500FT.
 - CONNECTION OF FENCES OR OTHER WAYSIDE DEVICES TO THE STATIC WIRE SHALL BE MADE BY BONDING TO THE BASE OF THE NEAREST OCS POLE OR ANOTHER STATIC WIRE BONDED STRUCTURE.
 - EXPOSED THIRD PARTY CONDUCTIVE ASSETS INSIDE OCLZ SHALL BE BONDED TO STATIC WIRE THROUGH THE NEAREST OCS POLE. EXPOSED THIRD PARTY CONDUCTIVE ASSETS OUTSIDE OCLZ AND WITHIN 45' FROM CENTERLINE OF NEAR ELECTRIFIED TRACK SHALL BE GROUNDED LOCALLY, COORDINATE WITH ASSET OWNER AND OBTAIN APPROVAL.
 - UTILITY GROUND IS EXISTING AND SHALL BE SEPARATE FROM TRACTION POWER RETURN SO THAT THERE ARE NO PHYSICAL ELECTRICAL CONNECTIONS BETWEEN UTILITY GROUND AND FACILITY GROUND.
 - METALLIC CONDUIT IN OVER-HEAD OR UNDER-GRADE BRIDGES SHALL BE BONDED TO TRACTION RETURN, OR INSULATED. IF CHOSEN, INSULATION SHALL WRAP METALLIC CONDUIT TO REMOVE ANY POTENTIAL OR EXCESSIVE TOUCH VOLTAGE OR RETURN CURRENT IN THAT CONDUIT. WRAP METALLIC CONDUIT WITH INSULATION MATERIAL EXTENDING 10 FT ON EACH SIDE OF THE OVERHEAD BRIDGE. COORDINATE WITH ASSET OWNER AND OBTAIN APPROVAL.
 - FOR EXPOSED WATER LINES, GAS LINES AND OTHER FLAMMABLE SUBSTANCES IN OVER-HEAD BRIDGES, ALL EXPOSED METALLIC CARRIER PIPES SHALL BE INSULATED IN ACCORDANCE WITH NOTE 8. FOR PRESSURIZED WATER LINES, EXPOSED METAL PIPE SHALL BE ENCASED (BY OTHERS NOT IN GROUNDING AND BONDING) IN A METAL CASING THAT IS ISOLATED FROM THE CARRIER PIPE BY APPROVED INSULATORS. METAL CASING SHALL BE BONDED TO THE RAILROAD STATIC WIRE. COORDINATE WITH ASSET OWNER TO OBTAIN APPROVAL. NOTIFY EOR IF AN ALTERNATIVE ISOLATION METHOD IS REQUIRED.
 - FOR FENCE GATES SEE DETAIL 2 AND 3 ON DWG E5505.
 - IF THIRD PARTY ELECTRIFIED FENCES FOR LIVESTOCK CONTROL ARE ENCOUNTERED ALONG THE WAY, CONTRACTOR SHALL CONFIRM WITH ENGINEER FOR SITE SPECIFIC GROUNDING AND INSULATING REQUIREMENTS. CONNECTIONS TO THIRD PARTY INFRASTRUCTURE SHALL BE COORDINATED AND APPROVED BY THIRD PARTY.
 - CONTRACTOR SHALL IDENTIFY THE THIRD PARTY FENCES OUTSIDE OCLZ BUT LESS THAN 45 FEET FROM CENTERLINE OF ELECTRIFIED TRACK, AND BOND LOCALLY USING GROUND RODS. CONTRACTOR SHALL COORDINATE WITH ASSET OWNER AND OBTAIN APPROVAL.
 - FOR OCLZ GROUNDING DETAILS TO THE NEAREST OCS POLE, AND GROUNDING LOCATIONS OF SIGNAL ELEMENTS, INCLUDING CROSS BONDS WITHIN OCLZ, REFER TO SIGNALS AND COMMUNICATIONS DUCTBANK DRAWINGS.

1 TYPICAL ROW GROUNDING AND BONDING
SCALE: NOT TO SCALE

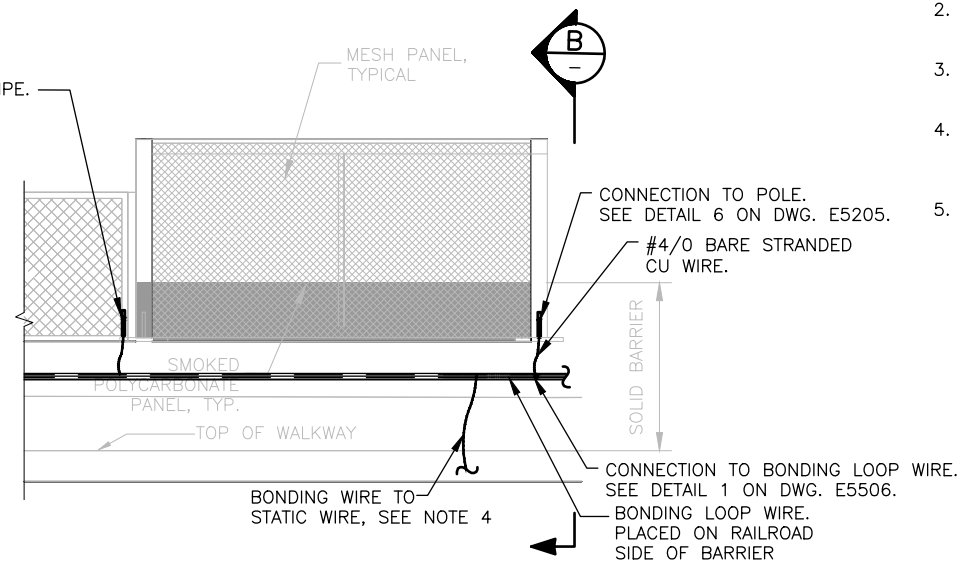
										PENINSULA CORRIDOR JOINT POWERS BOARD		STANDARD DRAWINGS		CADD FILE NAME: E5011	
										APPROVED BY: <i>Bin Zhang</i> DEPUTY DIRECTOR, ENGINEERING				ELECTRIFICATION PROJECT GROUNDING & BONDING BASIC DESIGN GROUNDING, BONDING AND SEPARATION REQUIREMENTS	
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NOTES:

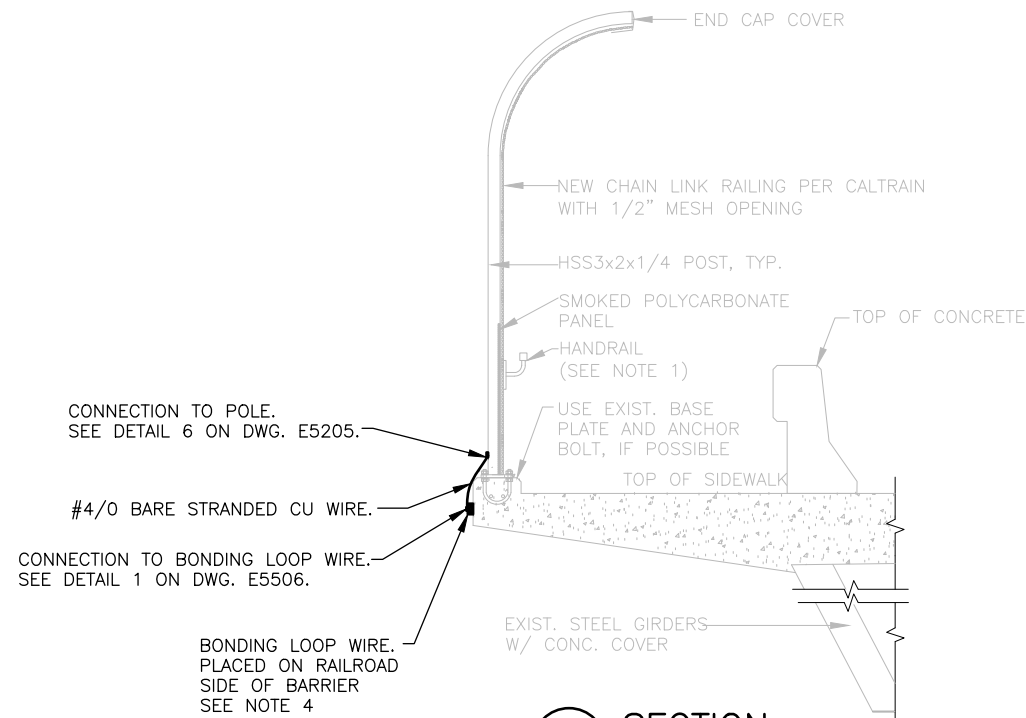
1. FOR PROTECTION BARRIER REQUIREMENTS, HEIGHT AND LENGTH, REFER TO BRIDGE ATTACHMENT DRAWINGS.
2. PROVIDE BONDING LOOP WIRE ON BOTH SIDES OF THE BRIDGE FACING THE RAILROAD, AND SUPPORT FROM THE BRIDGE.
3. PROVIDE BONDING CONDUCTOR TO BOND METALLIC POLE OF THE PROTECTION BARRIER TO THE BONDING LOOP WIRE.
4. PROVIDE BONDING CONDUCTOR TO BOND THE BONDING LOOP WIRE TO STATIC WIRE, AND SUPPORT THE BONDING CONDUCTOR FROM THE BRIDGE.
5. SEE DWGS E5202 AND E5203 FOR TYPICAL GROUNDING AND BONDING FOR CONCRETE BRIDGE AND STEEL BRIDGE.



1 ELEVATION VIEW OF CURVED FENCE
SCALE: NTS
NOTE: FOR FENCE AND BARRIER DIMENSIONS SEE NOTE 1.

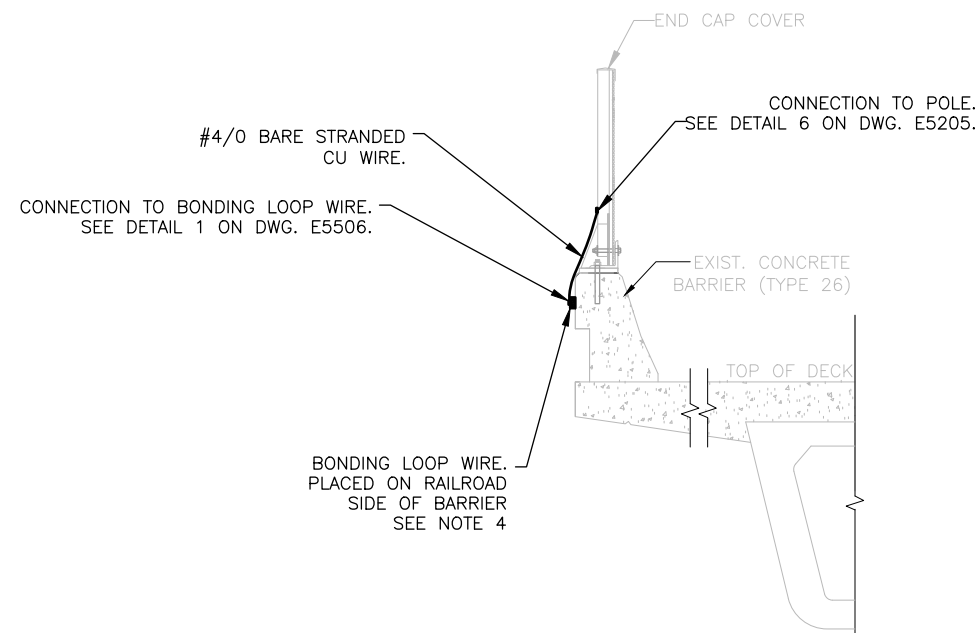


2 ELEVATION VIEW OF STRAIGHT FENCE
SCALE: NTS
NOTE: FOR FENCE AND BARRIER DIMENSIONS SEE NOTE 1.



A SECTION
SCALE: NTS

SIDE OF BRIDGE WITH WALKWAY



B SECTION
SCALE: NTS

SIDE OF BRIDGE WITHOUT WALKWAY

PENINSULA CORRIDOR JOINT POWERS BOARD

APPROVED BY:

Bin Zhang

DEPUTY DIRECTOR, ENGINEERING



1250 San Carlos Avenue
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STANDARD DRAWINGS

ELECTRIFICATION PROJECT
GROUNDING & BONDING BASIC DESIGN
TYPICAL BONDING LOOP
FOR PROTECTION BARRIER

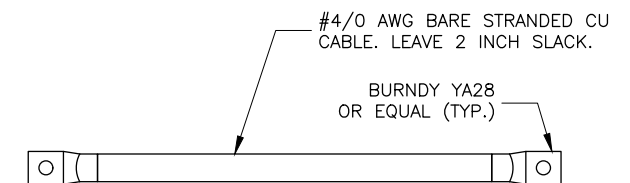
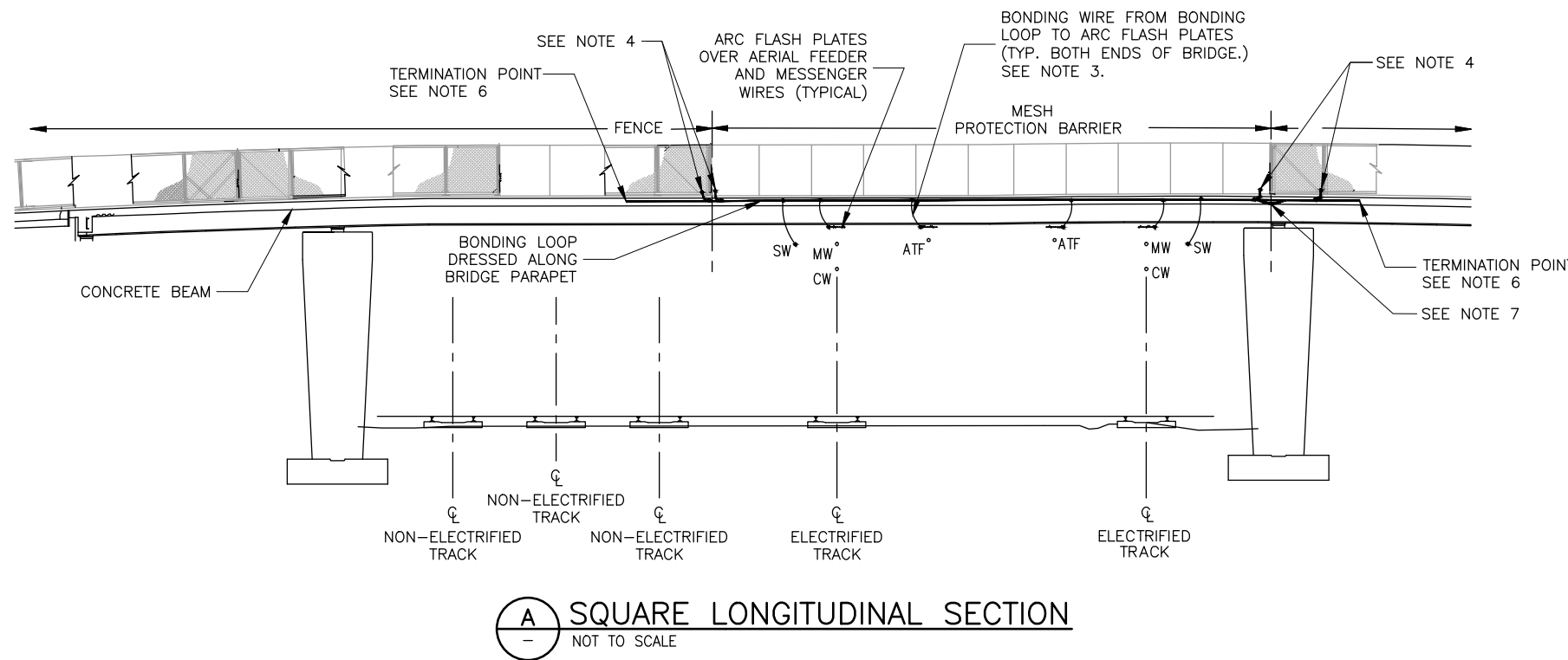
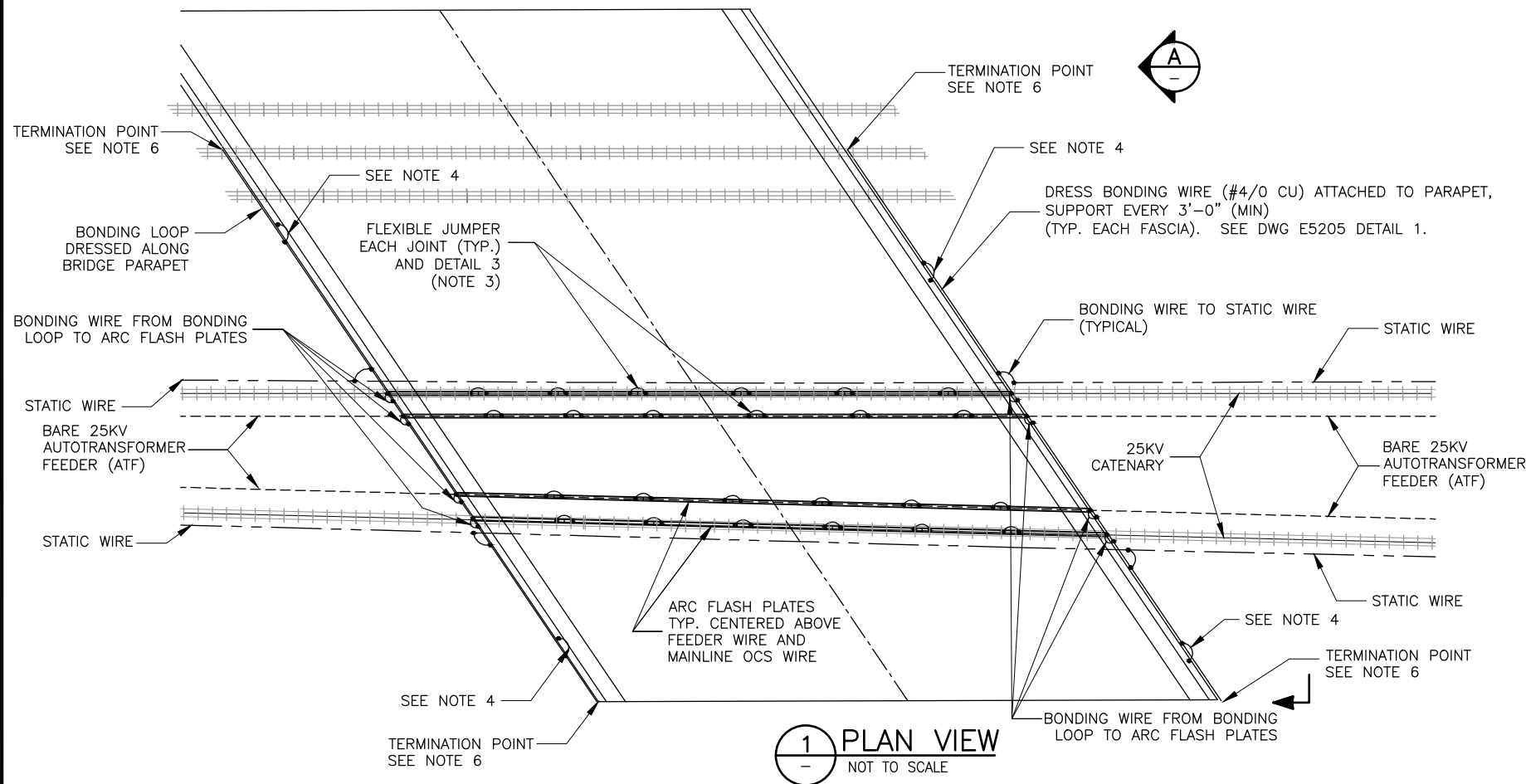
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E5201

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NOTES:

1. FOR LOCATION OF ARC FLASH PLATES AND FOR LOCATION AND DETAIL OF PROTECTION BARRIERS REFER TO BRIDGE ATTACHMENTS DRAWINGS.
2. THE LOCATION OF OCS WIRES (CW, MW, ATF AND SW) ARE SHOWN FOR REFERENCE ONLY, FOR EXACT LOCATION REFER TO OCS PLANS.
3. EACH ARC FLASH PLATE TO BE JUMPERED TO THE NEXT ARC FLASH PLATE (SEE DWG E5205 DETAIL 3). EACH END ARC FLASH PLATE TO BE JUMPERED TO THE BONDING LOOP USING A BOND CABLE CRIMP (SEE DWG E5506 DETAIL1). SEE DWG E5507 FOR BONDING OF ARC FLASH PLATE DETAILS.
4. BOND PROTECTION BARRIER TO BONDING LOOP, REFER TO DWG. E5201 FOR DETAILS.
5. BRIDGE AND OCS STRUCTURES ARE FOR REFERENCE ONLY TO SHOW GROUNDING AND BONDING; AND DO NOT PORTRAY EXISTING BRIDGE CONDITIONS OR PROPOSED OCS STRUCTURE ASSEMBLY.
6. TERMINATE CROSS-CONNECT JUMPER CONDUCTOR A MINIMUM OF 20 FEET NORMAL TO THE CATENARY WIRE AND A MINIMUM OF 10 FEET NORMAL TO THE AUTOTRANSFORMER FEED (ATF).
7. AT EXPANSION JOINTS, PROVIDE SUFFICIENT SLACK IN THE BONDING CONDUCTOR TO ALLOW FOR BRIDGE EXPANSION JOINT MOVEMENT.

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PENINSULA CORRIDOR JOINT POWERS BOARD

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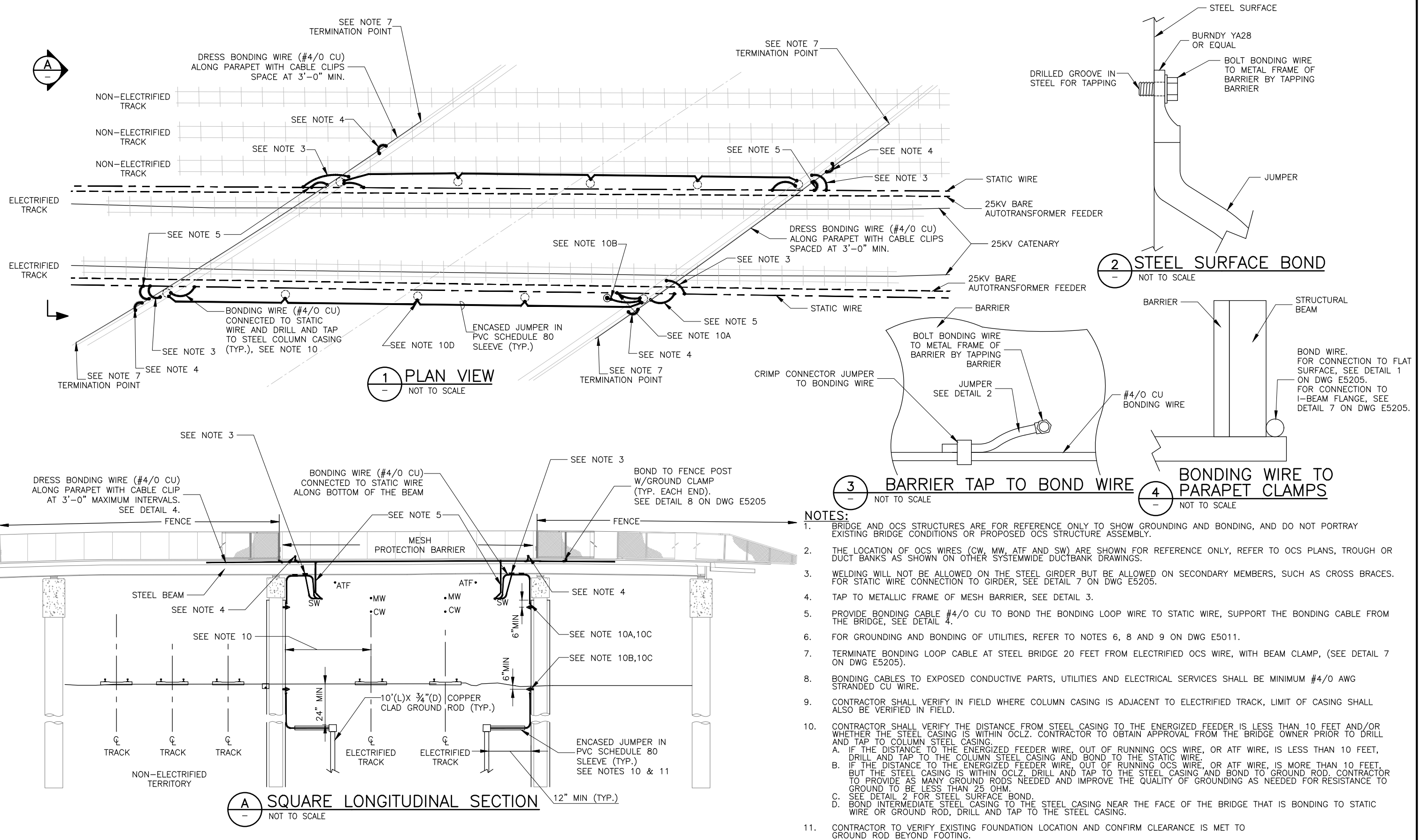


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STANDARD DRAWINGS

ELECTRIFICATION PROJECT
GROUNDING & BONDING BASIC DESIGN
TYPICAL CONCRETE BRIDGE

CADD FILE NAME: E5202	EDITION: 01012024
STANDARD DRAWING NO.: E5202	



- NOTES:**
- BRIDGE AND OCS STRUCTURES ARE FOR REFERENCE ONLY TO SHOW GROUNDING AND BONDING, AND DO NOT PORTRAY EXISTING BRIDGE CONDITIONS OR PROPOSED OCS STRUCTURE ASSEMBLY.
 - THE LOCATION OF OCS WIRES (CW, MW, ATF AND SW) ARE SHOWN FOR REFERENCE ONLY, REFER TO OCS PLANS, TROUGH OR DUCT BANKS AS SHOWN ON OTHER SYSTEMWIDE DUCTBANK DRAWINGS.
 - WELDING WILL NOT BE ALLOWED ON THE STEEL GIRDER BUT BE ALLOWED ON SECONDARY MEMBERS, SUCH AS CROSS BRACES. FOR STATIC WIRE CONNECTION TO GIRDER, SEE DETAIL 7 ON DWG E5205.
 - TAP TO METALLIC FRAME OF MESH BARRIER, SEE DETAIL 3.
 - PROVIDE BONDING CABLE #4/0 CU TO BOND THE BONDING LOOP WIRE TO STATIC WIRE, SUPPORT THE BONDING CABLE FROM THE BRIDGE, SEE DETAIL 4.
 - FOR GROUNDING AND BONDING OF UTILITIES, REFER TO NOTES 6, 8 AND 9 ON DWG E5011.
 - TERMINATE BONDING LOOP CABLE AT STEEL BRIDGE 20 FEET FROM ELECTRIFIED OCS WIRE, WITH BEAM CLAMP, (SEE DETAIL 7 ON DWG E5205).
 - BONDING CABLES TO EXPOSED CONDUCTIVE PARTS, UTILITIES AND ELECTRICAL SERVICES SHALL BE MINIMUM #4/0 AWG STRANDED CU WIRE.
 - CONTRACTOR SHALL VERIFY IN FIELD WHERE COLUMN CASING IS ADJACENT TO ELECTRIFIED TRACK, LIMIT OF CASING SHALL ALSO BE VERIFIED IN FIELD.
 - CONTRACTOR SHALL VERIFY THE DISTANCE FROM STEEL CASING TO THE ENERGIZED FEEDER IS LESS THAN 10 FEET AND/OR WHETHER THE STEEL CASING IS WITHIN OCLZ. CONTRACTOR TO OBTAIN APPROVAL FROM THE BRIDGE OWNER PRIOR TO DRILL AND TAP TO COLUMN STEEL CASING.
 - IF THE DISTANCE TO THE ENERGIZED FEEDER WIRE, OUT OF RUNNING OCS WIRE, OR ATF WIRE, IS LESS THAN 10 FEET, DRILL AND TAP TO THE COLUMN STEEL CASING AND BOND TO THE STATIC WIRE.
 - IF THE DISTANCE TO THE ENERGIZED FEEDER WIRE, OUT OF RUNNING OCS WIRE, OR ATF WIRE, IS MORE THAN 10 FEET, BUT THE STEEL CASING IS WITHIN OCLZ, DRILL AND TAP TO THE STEEL CASING AND BOND TO GROUND ROD. CONTRACTOR TO PROVIDE AS MANY GROUND RODS NEEDED AND IMPROVE THE QUALITY OF GROUNDING AS NEEDED FOR RESISTANCE TO GROUND TO BE LESS THAN 25 OHM.
 - SEE DETAIL 2 FOR STEEL SURFACE BOND.
 - BOND INTERMEDIATE STEEL CASING TO THE STEEL CASING NEAR THE FACE OF THE BRIDGE THAT IS BONDING TO STATIC WIRE OR GROUND ROD, DRILL AND TAP TO THE STEEL CASING.
 - CONTRACTOR TO VERIFY EXISTING FOUNDATION LOCATION AND CONFIRM CLEARANCE IS MET TO GROUND ROD BEYOND FOOTING.

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APPROVED BY:

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STANDARD DRAWINGS

ELECTRIFICATION PROJECT
GROUNDING & BONDING BASIC DESIGN
TYPICAL STEEL BRIDGE

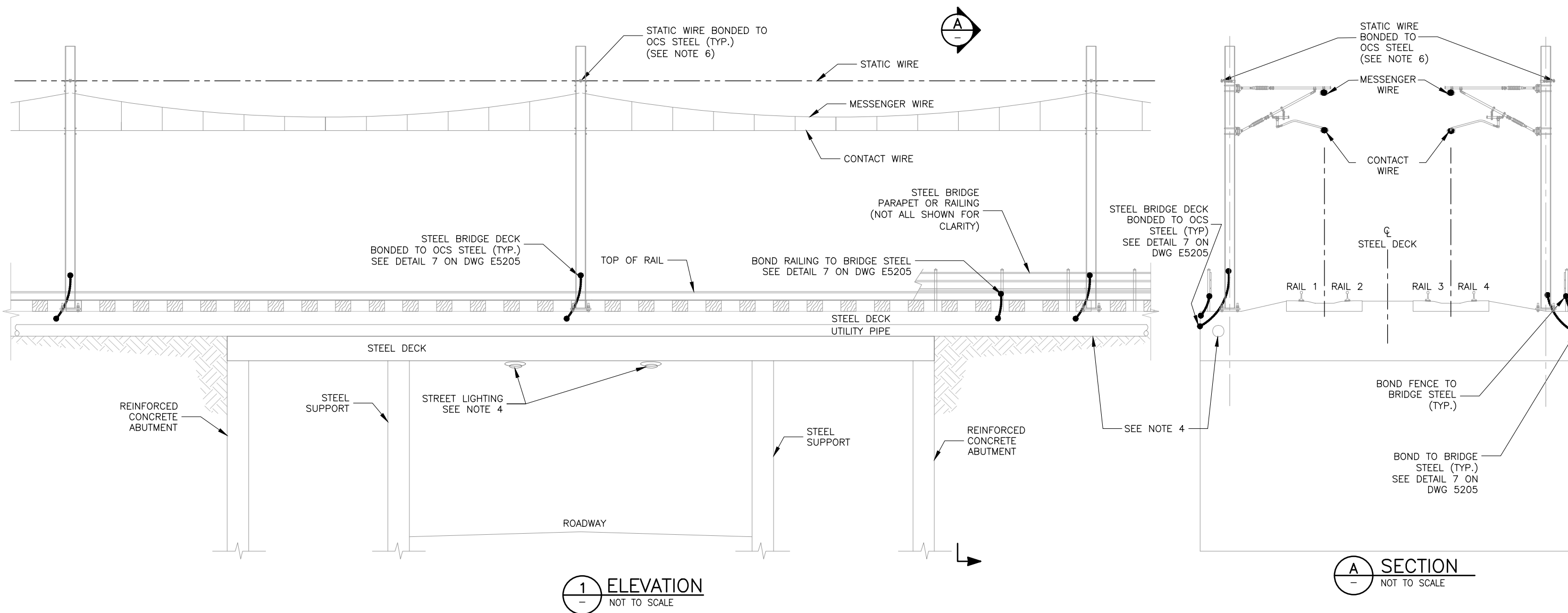
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E5203

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 01012024

STANDARD DRAWING NO.:
E5203

NOTES:

1. BOND BRIDGE STRUCTURE TO STATIC WIRE AT EACH END OF, AND ON OPPOSITE SIDES OF, BRIDGE.
2. ALL BRIDGE METALLIC STRUCTURES MUST BE BONDED (STEEL PARAPET, STEEL HANDRAILS, STEEL DECK, STEEL BRIDGE SUPPORT, UTILITY PIPES) SEE NOTES 6, 8 AND 9 ON DWG E5011.
3. BRIDGE AND OCS STRUCTURES ARE FOR REFERENCE ONLY TO SHOW GROUNDING AND BONDING AND DO NOT PORTRAY EXISTING BRIDGE CONDITIONS OR PROPOSED STRUCTURE ASSEMBLY.
4. FOR GROUNDING AND BONDING OF UTILITIES, REFER TO NOTES 6, 8 AND 9 ON DWG E5011.
5. BONDING CABLES SHALL BE #4/0 AWG CU. AT TRACK LEVEL OR IN EASILY ACCESSIBLE AREAS, BONDING CABLES SHALL BE ERICO OR ANTITHEFT EQUAL APPROVED WIRE WITH EQUIVALENT ELECTRICAL PROPERTIES.
6. FOR STATIC WIRE CONNECTION TO WIDE FLANGE SEE DETAIL 4 ON DRAWING E5205. USE STATIC WIRE SUPPORT AS SHOWN ON DRAWING W6112, EXCEPT FOR STATION.



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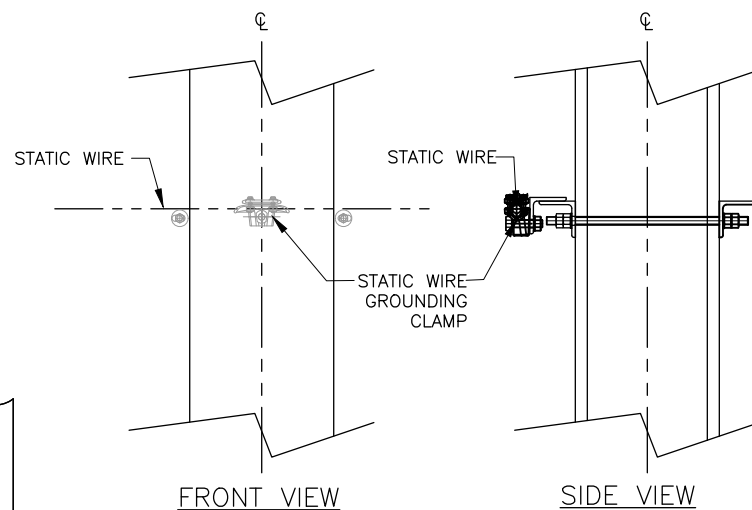
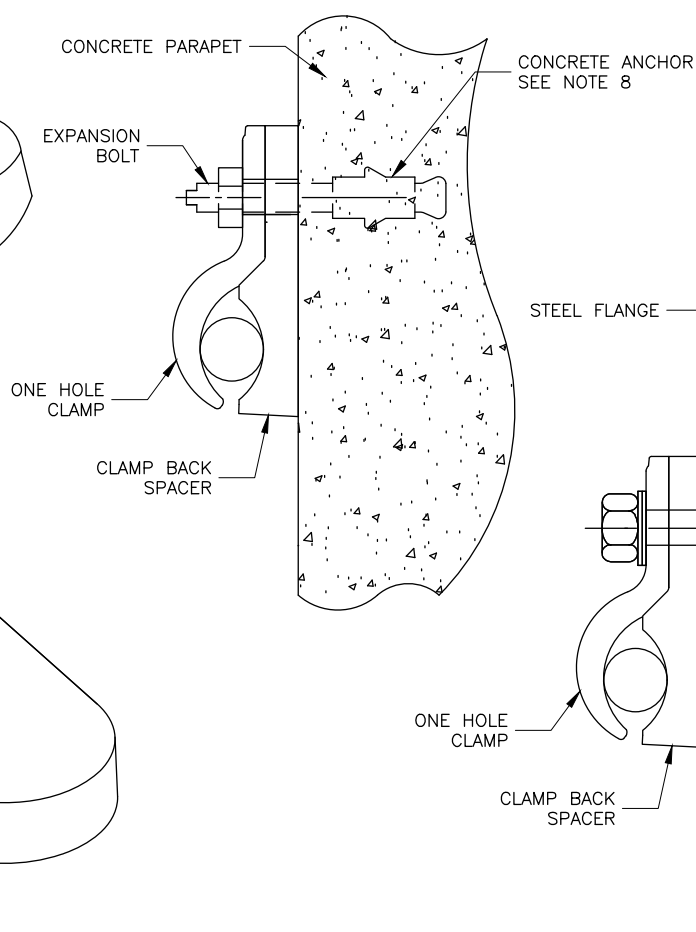
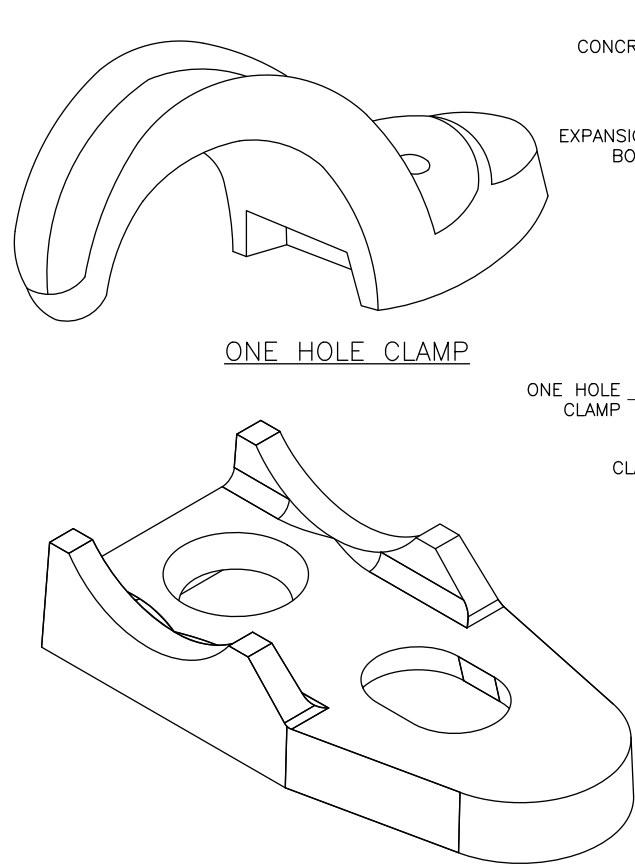
DEPUTY DIRECTOR, ENGINEERING

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STANDARD DRAWINGS

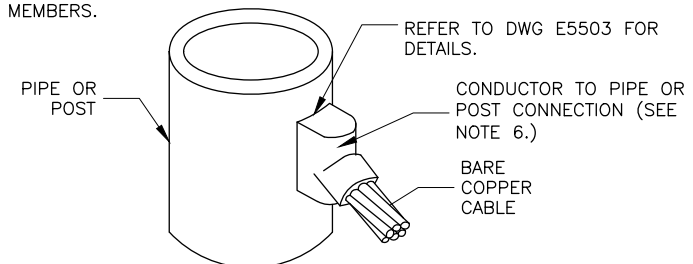
ELECTRIFICATION PROJECT
GROUNDING & BONDING BASIC DESIGN
TYPICAL UNDERPASS
STEEL DECK BRIDGE

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REV:	EDITION: 01012024
STANDARD DRAWING NO.: E5204	



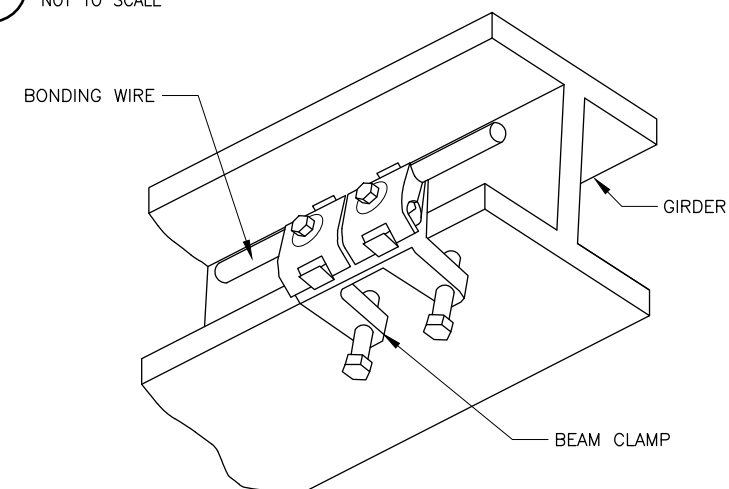
4 STATIC WIRE CONNECTION TO STANDARD WIDE FLANGE
NOT TO SCALE

- NOTES:**
- USE DETAIL 1 TO SUPPORT CROSS-CONNECT WIRES AT BRIDGE OVERPASSES.
 - FURNISH BONDING AND CROSS-CONNECT JUMPERS AS #4/0 AWG BARE CU WIRE UNLESS NOTED OTHERWISE. AT TRACK LEVEL OR IN EASILY ACCESSIBLE AREAS, BONDING CONDUCTOR SHALL BE ERICO OR ANTITHEFT EQUAL APPROVED WIRE WITH EQUIVALENT ELECTRICAL PROPERTIES.
 - ALL BURIED OR CONCRETE ENCASED GROUND CLAMPS TO BE RATED FOR DIRECT BURIAL.
 - GROUND CLAMPS TO BE BURNDY 22C037, 22C034, 22C041 (BASED ON POST DIAMETER) OR APPROVED EQUAL. WHERE ERICO OR ANTITHEFT APPROVED EQUAL WIRES ARE USED, PROVIDE SUITABLE GROUND CLAMPS.
 - REFER TO OCS POLE DRAWINGS FOR OCS POLE DETAILS.
 - REFER TO DWG E5503 DETAIL 1 FOR MORE EXOTHERMIC WELD CONNECTIONS.
 - FOR STATIC WIRE CONNECTION TO OCS POLE REFER TO DWG W5110 DETAIL 2.
 - DO NOT DRILL OR INSTALL CONCRETE ANCHORS IN PRE-STRESSED OR POST TENSIONED MEMBERS.

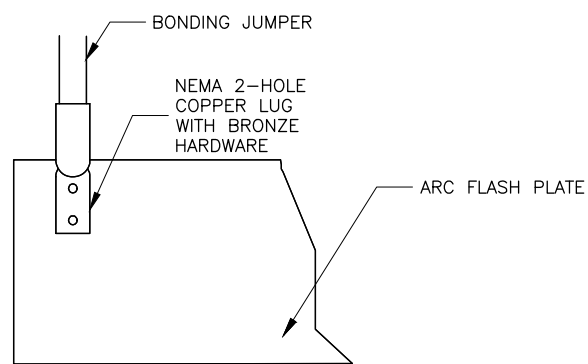


6 EXOTHERMIC WELD TO PIPE/POST
NOT TO SCALE

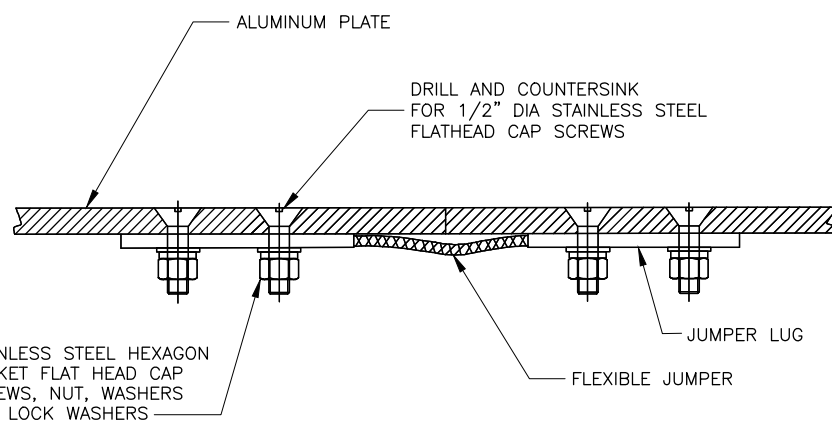
1 CROSS CONNECT CONDUCTOR JUMPER SUPPORT
(FROM CONCRETE OR STEEL)
NOT TO SCALE



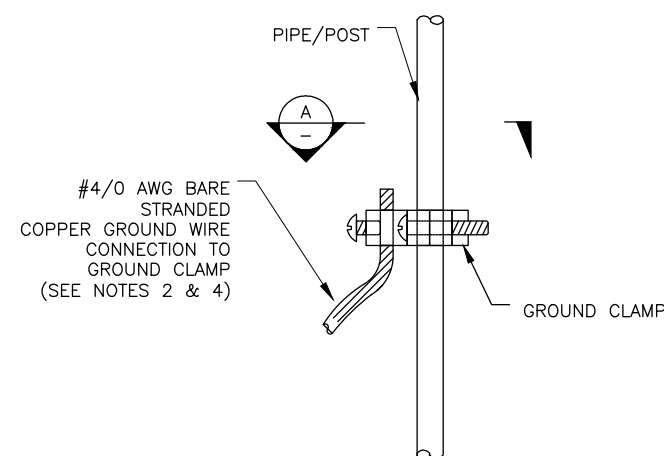
7 BEAM CLAMP (PAIRED)
NOT TO SCALE



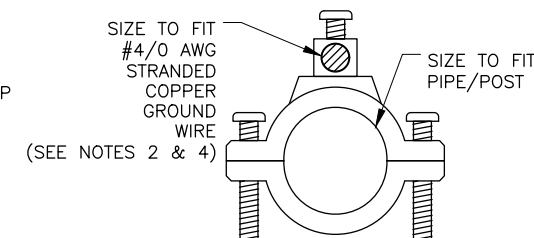
2 BONDING JUMPER TO ARC FLASH PLATE CONNECTION DETAIL
NOT TO SCALE



3 ARC-FLASH SCREEN PLATE CONNECTION DETAIL
NOT TO SCALE



8 GROUND CLAMP CONNECTION
NOT TO SCALE



A COPPER CLAMP
NOT TO SCALE

PENINSULA CORRIDOR JOINT POWERS BOARD

APPROVED BY:

Bin Zhang

DEPUTY DIRECTOR, ENGINEERING



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San Carlos, CA 94070

STANDARD DRAWINGS

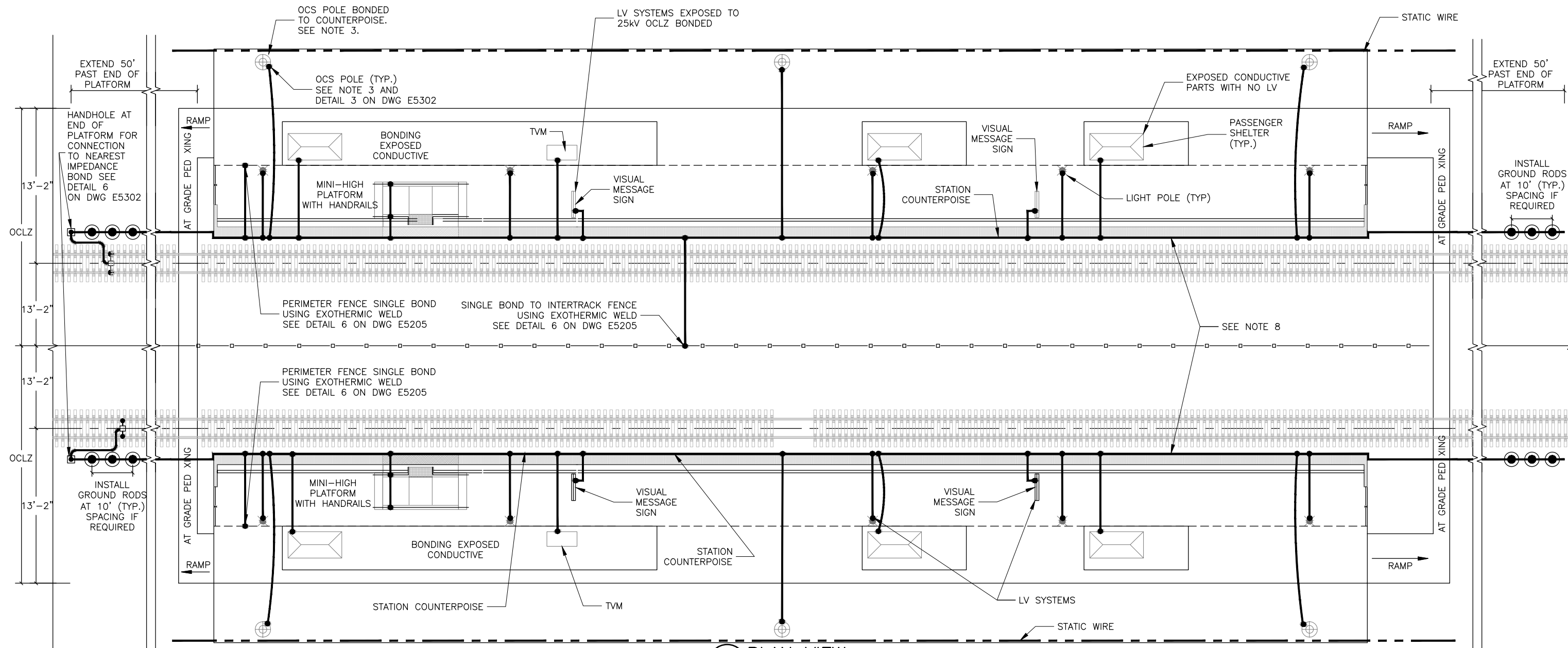
ELECTRIFICATION PROJECT
GROUNDING & BONDING BASIC DESIGN
TYPICAL BRIDGE GROUNDING AND
BONDING CONNECTION DETAILS

CADD FILE NAME:
E5205

REV: EDITION:
01012024

STANDARD DRAWING NO.:
E5205

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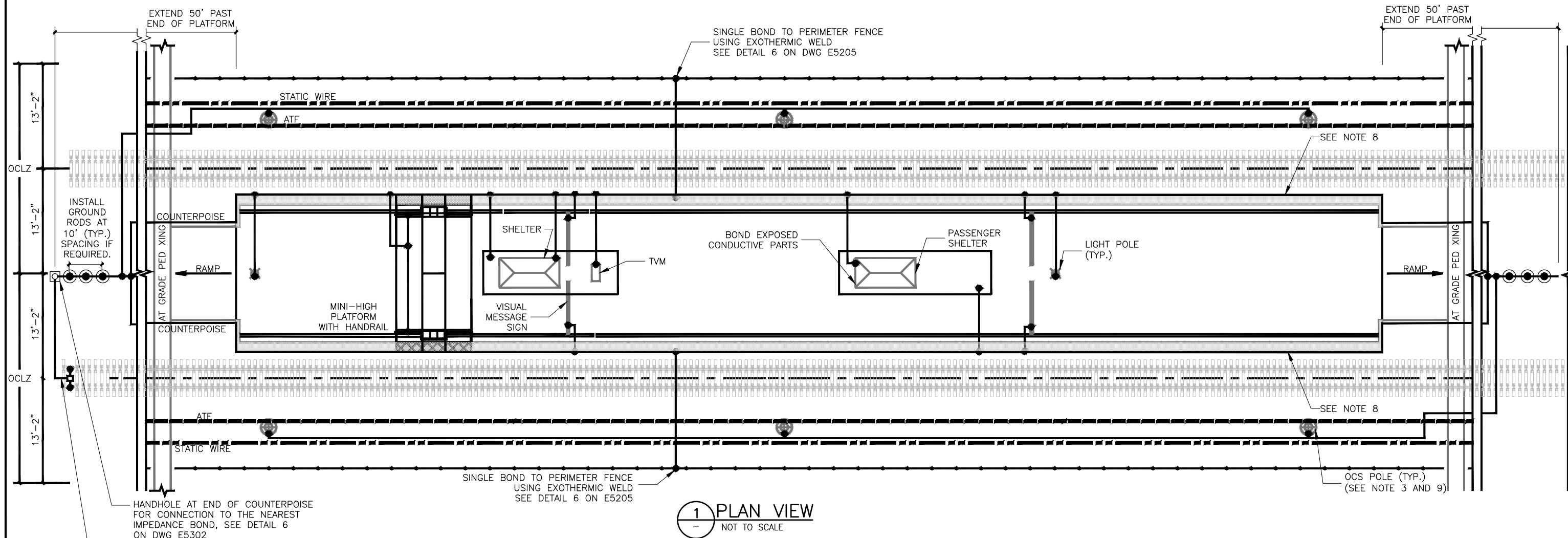


1 PLAN VIEW
- NOT TO SCALE

NOTES:

1. BOND ALL METALLIC OBJECTS, STRUCTURES AND MISCELANEOUS ITEMS CAPABLE OF PICKING UP INDUCTION OR CARRYING FAULT CURRENT, LOCATED WITHIN 8FT FROM THE EDGE OF THE PLATFORM OR A GROUNDED OBJECT, TO THE COUNTERPOISE OR GROUNDING CONDUCTOR. (EXCEPTION: METALLIC OBJECTS SMALLER THAN 6' PERPENDICULAR TO TRACK X 8' PARALLEL TO TRACK NEED NOT BE BONDED). FOR LOW VOLTAGE EQUIPMENT, COORDINATE WITH ASSET OWNER AND OBTAIN APPROVAL.
2. METALLIC DRAIN COVERS IN THE OCLZ SHALL BE REPLACED WITH NON-CONDUCTING COVERS.
3. OCS POLES, WITHIN THE LIMIT OF PLATFORMS, SHALL BE BONDED TO THE COUNTERPOISE AND ISOLATED FROM STATIC WIRE. FOR PORTAL TYPE OCS POLE, ONLY ONE SIDE SHALL BE BONDED TO THE COUNTERPOISE, AND ISOLATED FROM STATIC WIRE. THE POLE SYMBOL IS FOR REFERENCE ONLY, REFER TO OCS PLANS FOR OCS WIDE FLANGE POLE, ROUND POLE AND STRUCTURAL TUBE POLE.
4. FOR LOCATION OF DRAIN BONDS AND/OR IMPEDANCE BOND, REFER TO NEUTRAL RETURN PACKAGE.
5. THIS DIAGRAM IS SCHEMATIC FOR TYPICAL OUTBOUND PLATFORMS STATIONS ONLY, AND IS NOT APPLICABLE TO OTHER STATION CONFIGURATIONS.
6. ALL FENCES IN OCLZ TO BE MADE ELECTRICALLY CONTINUOUS.
7. METALLIC STRUCTURES AND MISCELLANEOUS METALLIC ITEMS AS DESCRIBED IN NOTE 1, WITHIN 8 FEET FROM THE EDGE OF THE PLATFORM, ON PLATFORM, INCLUDING ANY OCS POLES, SHALL BE ISOLATED FROM THE STATIC WIRE AND SHALL BE BONDED DIRECTLY OR INDIRECTLY TO THE COUNTERPOISE OR GROUNDING CONDUCTOR. PLATFORM REINFORCEMENT STEEL SHALL BE ISOLATED FROM THE STATIC WIRE.
8. INSTALL GROUND RODS AND CONNECT TO COUNTERPOISE ALONG PLATFORM EVERY 50'. IF NOT POSSIBLE, CONSIDER ALTERNATE RUN FOR COUNTERPOISE SUCH AS EMBEDDED IN SAW-CUT CLOSE TO PLATFORM EDGE ALONG YELLOW LINE AND BACKFILL SIMILAR TO PLATFORM CABLE CROSSING AS SHOWN IN DRAWING E5302 DETAIL 1. COUNTERPOISE SHALL BE GROUNDED BY BONDED TO DRIVING MULTIPLE GROUND RODS AT THE END OF THE PLATFORMS AND IF POSSIBLE ADDITIONAL RODS NEXT TO STRUCTURE COLUMNS, AS PER ENGINEER'S APPROVAL.
9. NUMBER OF GROUND RODS SHALL PROVIDE A COUNTERPOISE TO EARTH RESISTANCE OF 5 OHMS AND PROVIDE SAFE TOUCH AND STEP POTENTIALS.
10. FOR BONDING CABLE CROSSING THE PLATFORM, SEE DETAIL 1 ON DWG E5302.
11. THE COUNTERPOISE OR GROUNDING-CONDUCTOR-BONDED METALLIC ITEMS SHALL BE ISOLATED FROM STEEL BUILDING GROUNDS AND FROM UTILITY GROUNDS.
12. STATION PLATFORM LOCATIONS REQUIRING CONDUIT FOR GROUNDING WORK, ARE PER SIGNALS AND COMMUNICATIONS DUCTBANK DRAWINGS.

01012024 EDITION										PENINSULA CORRIDOR JOINT POWERS BOARD		STANDARD DRAWINGS		CADD FILE NAME: E5300			
										APPROVED BY: <i>Bin Zhang</i>				ELECTRIFICATION PROJECT GROUNDING & BONDING BASIC DESIGN TYPICAL OUTBOUND PLATFORMS		REV:	EDITION: 01012024
REV	DATE	BY	CHK	APP	REV	DATE	BY	CHK	APP	DEPUTY DIRECTOR, ENGINEERING						STANDARD DRAWING NO.: E5300	



1 PLAN VIEW
NOT TO SCALE

NOTES:

1. BOND ALL METALLIC OBJECTS, STRUCTURES AND MISCELLANEOUS ITEMS CAPABLE OF PICKING UP INDUCTION OR CARRYING FAULT CURRENT, LOCATED WITHIN 8 FT FROM THE EDGE OF THE PLATFORM OR GROUNDED OBJECT, TO THE COUNTERPOISE OR GROUNDING CONDUCTOR. (EXCEPTION: METALLIC OBJECT SMALLER THAN 6" PERPENDICULAR TO TRACK X 8' PARALLEL TO TRACK NEED NOT BE BONDED). FOR LOW VOLTAGE EQUIPMENT, COORDINATE WITH ASSET OWNER AND OBTAIN APPROVAL.
2. METALLIC DRAIN COVERS IN THE OCLZ SHALL BE REPLACED WITH NON-CONDUCTING COVERS.
3. OCS POLES, WITHIN THE LIMIT OF PLATFORMS, SHALL BE BONDED TO THE COUNTERPOISE AND ISOLATED FROM STATIC WIRE. FOR PORTAL TYPE OCS POLE, ONLY ONE SIDE SHALL BE BONDED TO THE COUNTERPOISE, AND ISOLATED FROM STATIC WIRE. THE POLE SYMBOL IS FOR REFERENCE ONLY, REFER TO OCS PLANS FOR OCS WIDE FLANGE POLE, ROUND POLE AND STRUCTURAL TUBE POLE.
4. FOR LOCATION OF DRAIN BONDS AND/OR IMPEDANCE BOND, REFER TO NEUTRAL RETURN PACKAGE.
5. THIS DIAGRAM IS SCHEMATIC FOR TYPICAL CENTER ISLAND PLATFORMS STATIONS ONLY, AND IS NOT APPLICABLE TO OTHER STATION CONFIGURATIONS.
6. ALL FENCES IN OCLZ TO BE MADE ELECTRICALLY CONTINUOUS.
7. METALLIC STRUCTURES AND MISCELLANEOUS METALLIC ITEMS AS DESCRIBED IN NOTE 1, WITHIN 8 FEET FROM THE EDGE OF THE PLATFORM, ON PLATFORM, INCLUDING ANY OCS POLES, SHALL BE ISOLATED FROM THE STATIC WIRE AND SHALL BE BONDED DIRECTLY OR INDIRECTLY TO THE COUNTERPOISE OR GROUNDING CONDUCTOR. PLATFORM REINFORCEMENT STEEL SHALL BE ISOLATED FROM THE STATIC WIRE.
8. INSTALL GROUND RODS AND CONNECT TO COUNTERPOISE ALONG PLATFORM EVERY 50'. IF NOT POSSIBLE, CONSIDER ALTERNATE RUN FOR COUNTERPOISE SUCH AS EMBEDDED IN SAW-CUT CLOSE TO PLATFORM EDGE ALONG YELLOW LINE AND BACKFILL SIMILAR TO PLATFORM CABLE CROSSING AS SHOWN IN DRAWING E5302 DETAIL 1. COUNTERPOISE SHALL BE GROUNDED BY BONDING TO DRIVING MULTIPLE GROUND RODS AT THE END OF THE PLATFORMS AND IF POSSIBLE ADDITIONAL RODS NEXT TO STRUCTURE COLUMNS, AS PER ENGINEER'S APPROVAL.
9. NUMBER OF GROUND RODS SHALL PROVIDE A COUNTERPOISE TO EARTH RESISTANCE OF 5 OHMS AND PROVIDE SAFE TOUCH AND STEP POTENTIALS.
10. FOR BONDING CABLE CROSSING THE PLATFORM, SEE DETAIL 1 ON DWG E5302.
11. THE COUNTERPOISE OR GROUNDING-CONDUCTOR-BONDED METALLIC ITEMS SHALL BE ISOLATED FROM STEEL BUILDING GROUNDS AND FROM UTILITY GROUNDS.
12. STATION PLATFORM LOCATIONS REQUIRING CONDUIT FOR GROUNDING WORK, ARE PER SIGNALS AND COMMUNICATIONS DUCTBANK DRAWINGS.

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PENINSULA CORRIDOR JOINT POWERS BOARD

APPROVED BY:

Bin Zhang

DEPUTY DIRECTOR, ENGINEERING

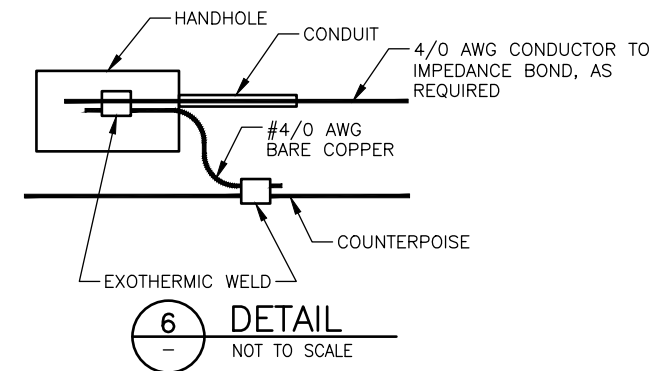
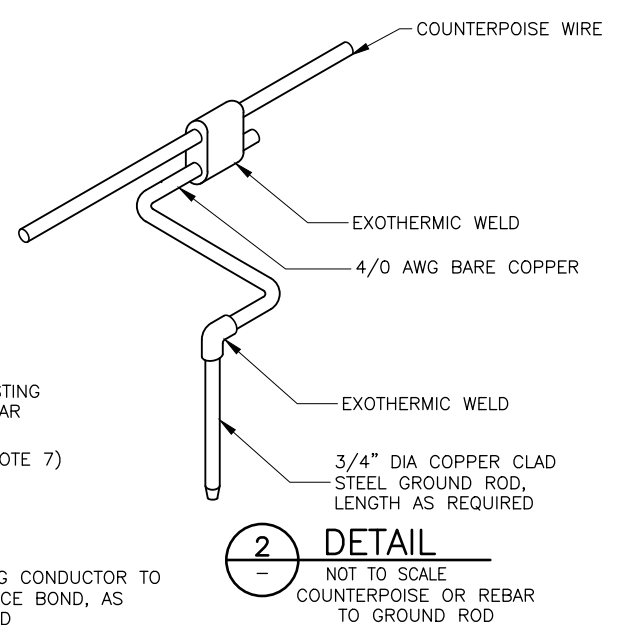
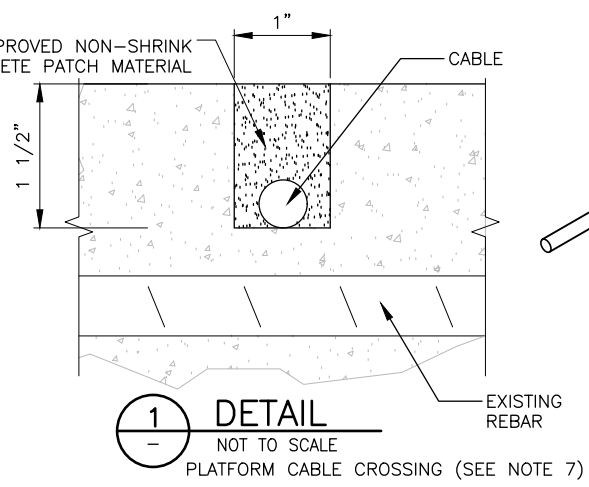
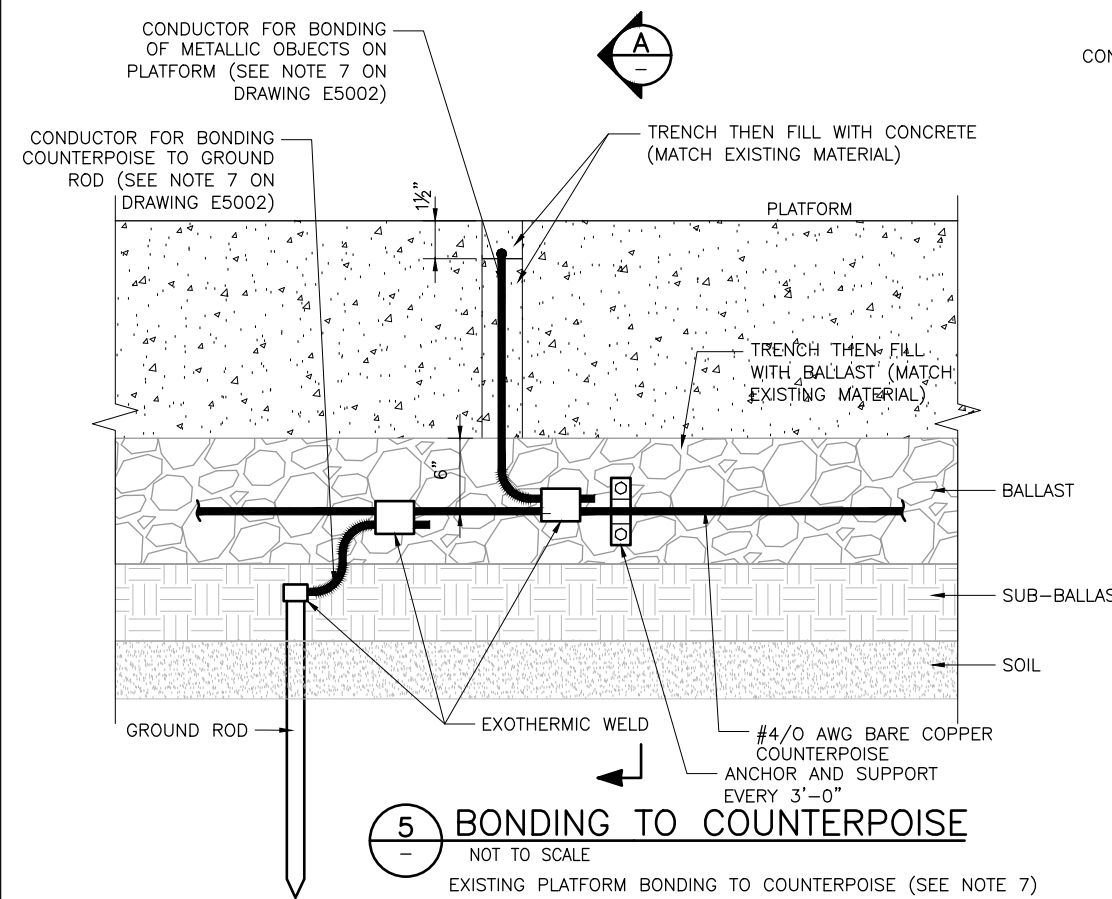
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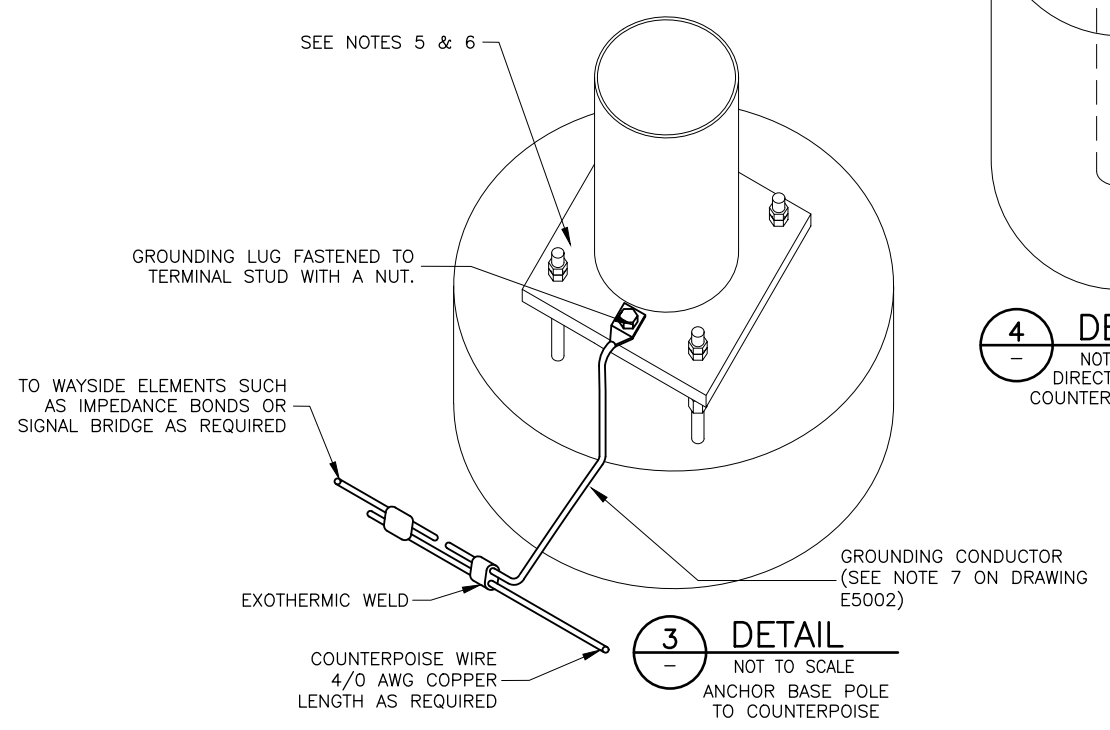
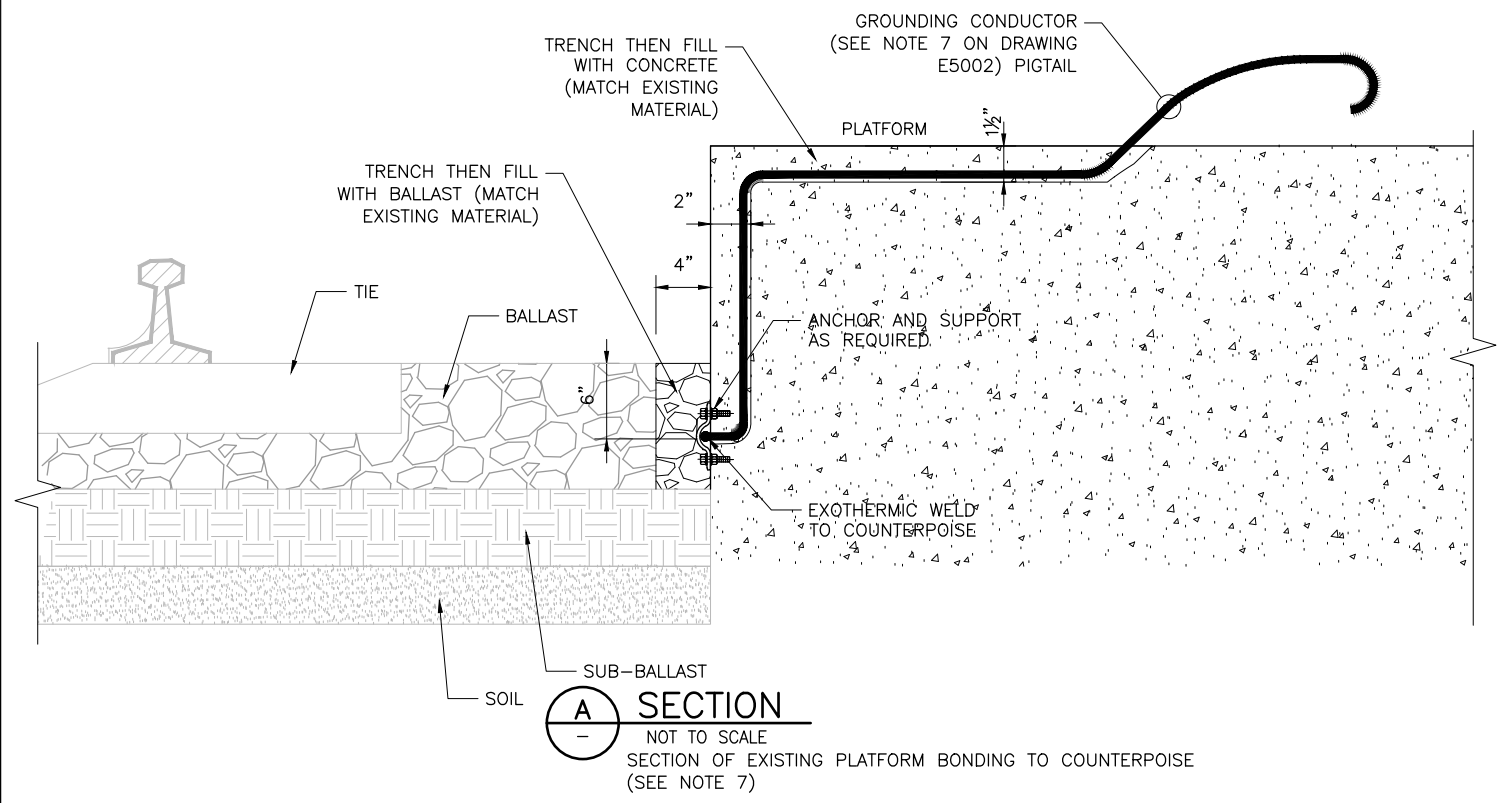
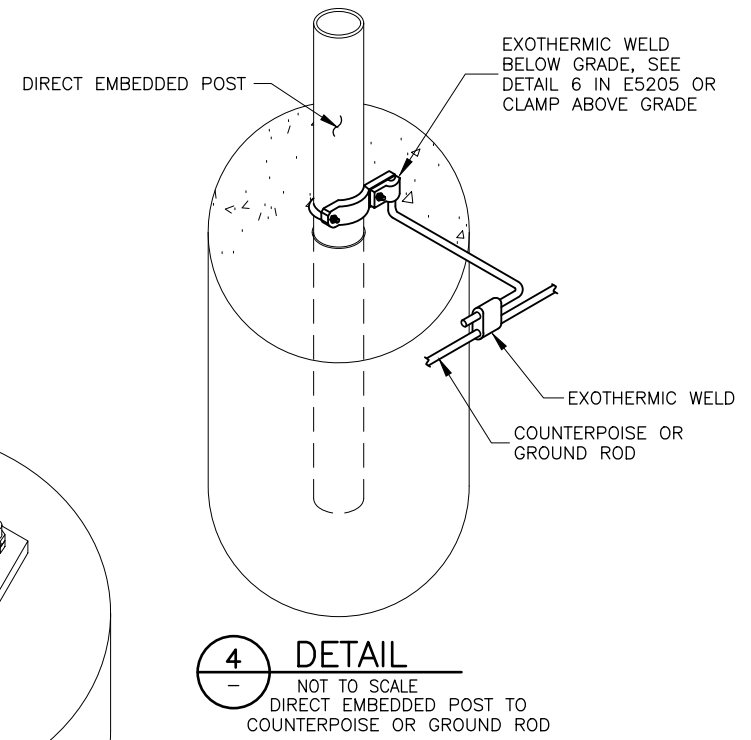
ELECTRIFICATION PROJECT
GROUNDING & BONDING BASIC DESIGN
TYPICAL CENTER ISLAND PLATFORM

CADD FILE NAME: E5301	
REV:	EDITION: 01012024
STANDARD DRAWING NO.: E5301	

01012024 EDITION



- NOTES:**
1. EXOTHERMIC WELD BURIED CONNECTIONS TO BE COATED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. SEE DWG E5503 FOR DETAILS.
 2. PREPARE SURFACE FOR EXOTHERMIC WELD IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. SEE DWG E5503 FOR DETAILS.
 3. EMBEDDED STEEL ITEMS TO BE BONDED TO GROUNDING SYSTEM WITH BELOW SURFACE CONNECTIONS WHEREVER POSSIBLE.
 4. WHERE ORNAMENTAL COVERS ARE USED OVER ANCHOR RODS, GROUND CONNECTIONS SHALL BE MADE WITHIN COVERS.
 5. FOR OCS POLE TO GROUND ROD CONNECTION, REFER TO DWG W5162, W5163, W5164, AND W5165.
 6. FOR TYPES OF POLE BASE IN I BEAM, CIRCULAR, SQUARE POLES, REFER TO OCS BASIC DESIGN POLES AND STRUCTURES DRAWINGS.
 7. DETAILS SHOWN ARE VALID FOR RETROFITTING EXISTING PLATFORMS. SAW CUTTING IS NOT ACCEPTABLE FOR NEW STATIONS GROUNDING AND BONDING ITEMS INSTALLATION.



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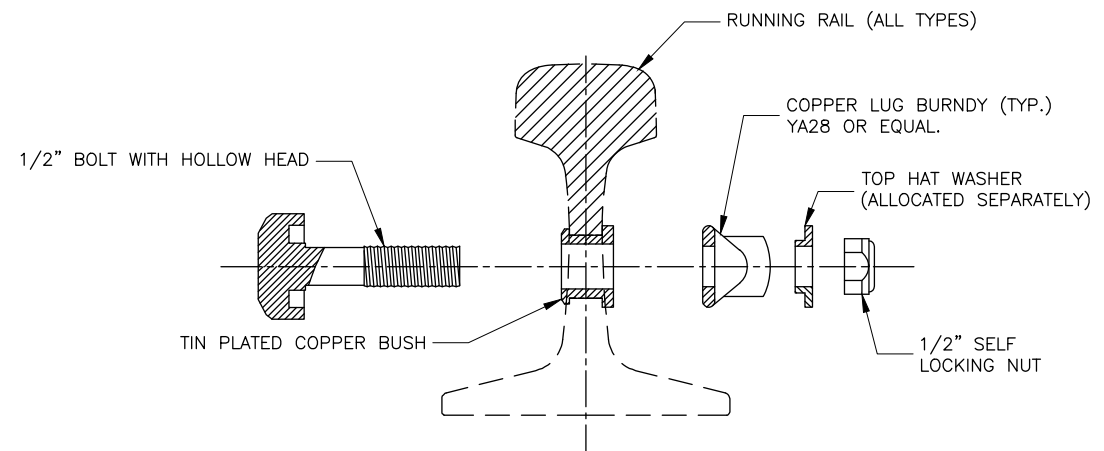
STANDARD DRAWINGS

ELECTRIFICATION PROJECT
GROUNDING & BONDING BASIC DESIGN
TYPICAL STATION PLATFORM
COUNTERPOISE GROUNDING AND
BONDING CONNECTIONS

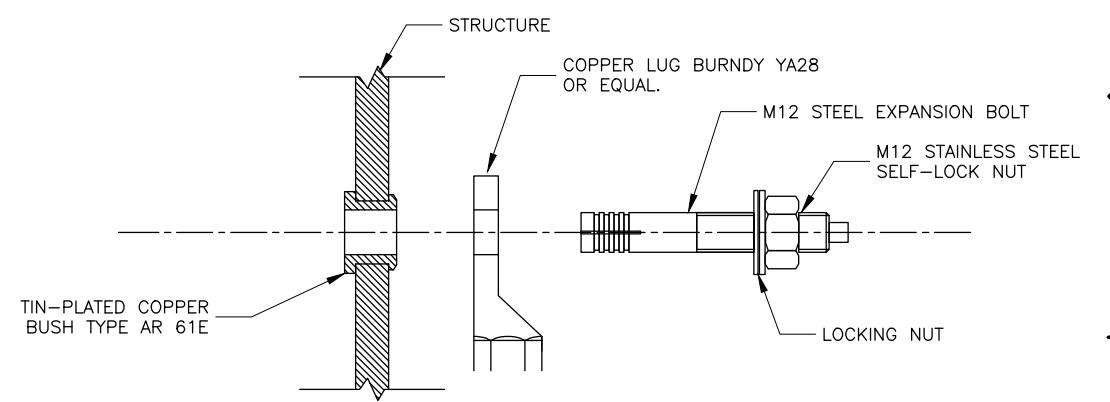
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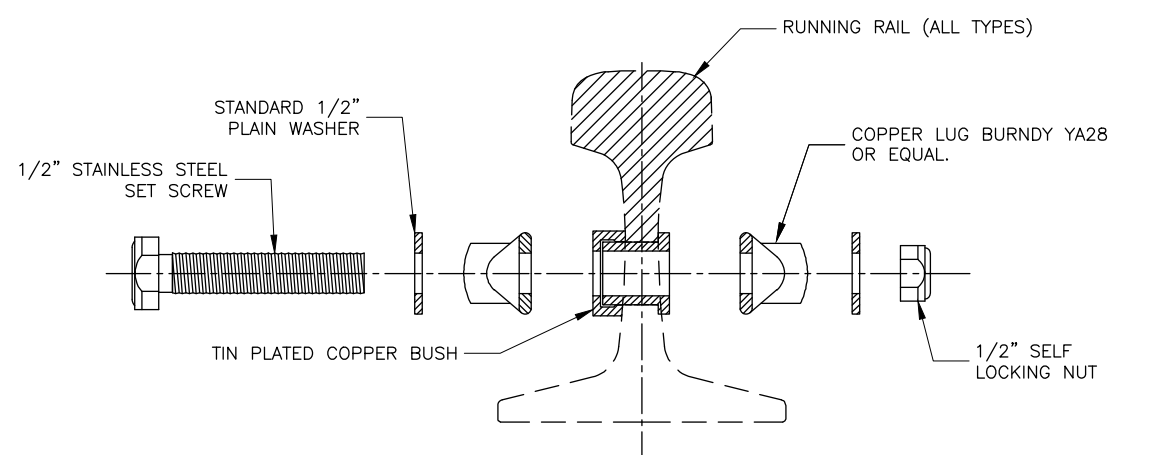
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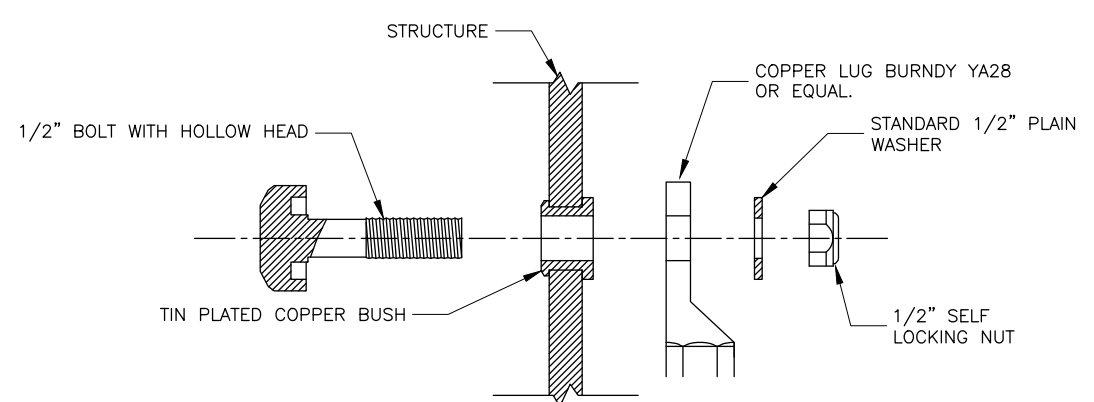
3 CEMBRE CONNECTION TO RAIL
NOT TO SCALE



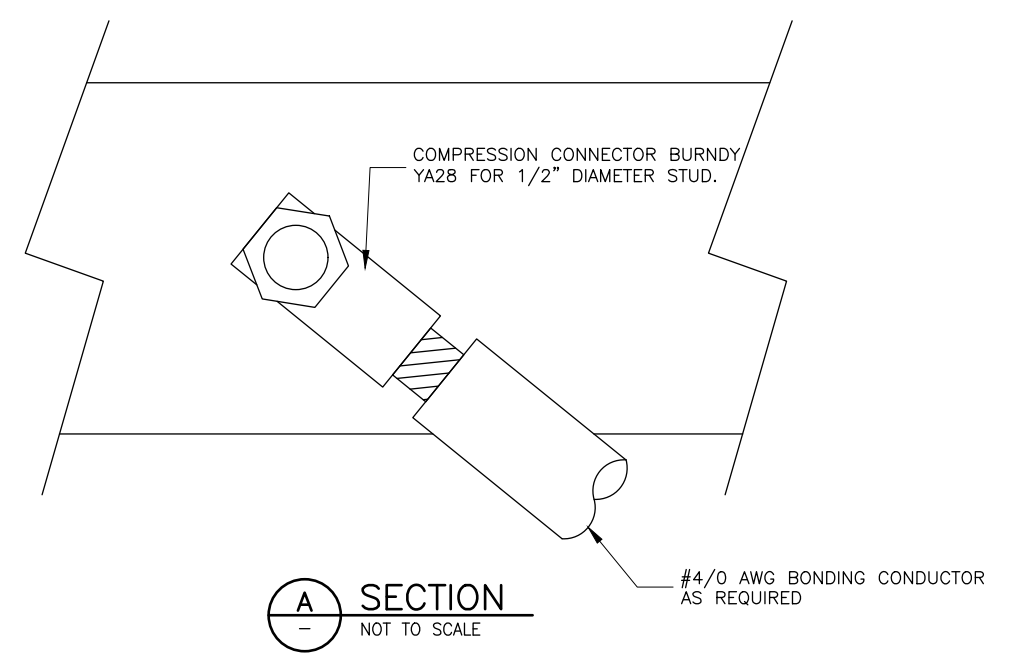
4 CEMBRE SINGLE SIDE BONDING CONNECTION TO STRUCTURE
NOT TO SCALE



2 CEMBRE DOUBLE-SIDED CONNECTION TO RAIL
NOT TO SCALE



1 CEMBRE CONNECTION TO STRUCTURE
NOT TO SCALE



A SECTION
NOT TO SCALE

NOTES:

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE STATED.
2. FOR INSTALLATION OF TIN PLATED COPPER BUSH REFER TO MANUFACTURER'S INSTALLATION INSTRUCTIONS.

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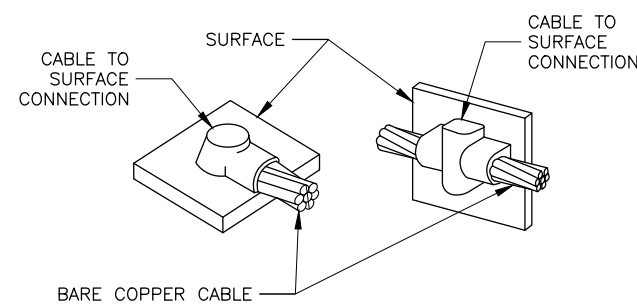
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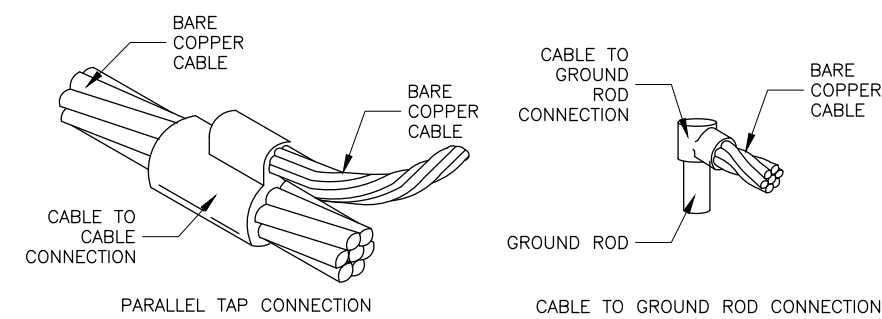
STANDARD DRAWINGS

ELECTRIFICATION PROJECT
GROUNDING & BONDING BASIC DESIGN
RAIL BONDING CONNECTIONS

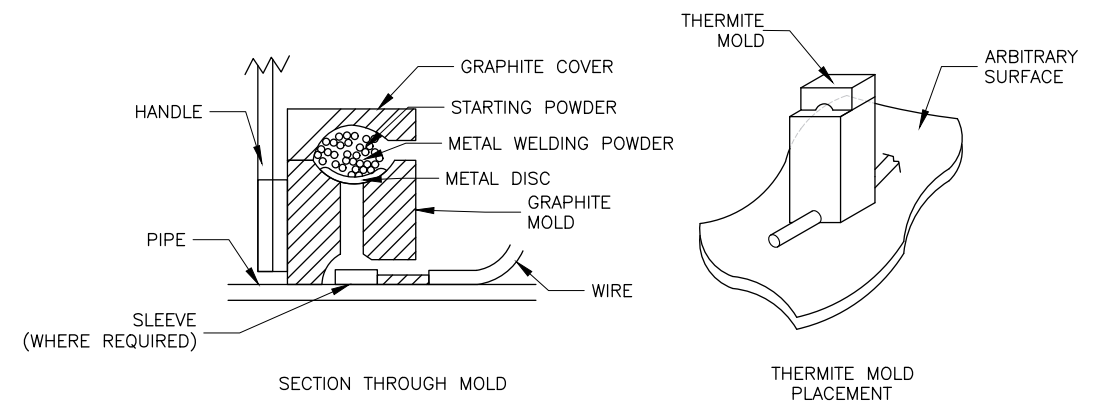
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REV:	
STANDARD DRAWING NO.:	E5500



SURFACE CONNECTIONS



1 EXOTHERMIC WELDS
NOT TO SCALE



- STEP 1 REMOVE 3"x3" COATING, FILE OR GRIND STRUCTURE CONNECTION AREA (3"x3") TO BARE SHINY METAL AND CLEAN.
- STEP 2 STRIP INSULATION FROM WIRE. ATTACH SLEEVE (REQUIRED ON #8 AWG WIRE OR SMALLER).
- STEP 3 HOLD MOLD FIRMLY WITH OPENING AWAY FROM OPERATOR AND IGNITE WITH FLINT GUN.
- STEP 4 REMOVE SLAG FROM CONNECTION AND PEEN WELD FOR SOUNDNESS.
- STEP 5 COAT WELD AREA AS REQUIRED PER SPECIFICATIONS.

2 THERMITE WELD DETAIL
NOT TO SCALE


DETAIL 1 AND 2 NOTES:

1. PREPARE SURFACE FOR WELD IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
2. TEST WELDS ON SURFACE WITH A 2 POUND HAMMER TEST.
3. COAT WELD LOCATIONS AS REQUIRED ON SURFACE WITH AN EPOXY COATING COMPATIBLE WITH THE SURFACE COATING SYSTEM.
4. COAT ALL AREAS OF STEEL AND COPPER AFTER WELDING.
5. EXOTHERMIC WELDS SHOWN IN DETAIL 1 ARE TYPICAL EXAMPLES. PROVIDE ADDITIONAL HORIZONTAL OR VERTICAL CONNECTIONS AS REQUIRED FOR GROUNDING AND BONDING.

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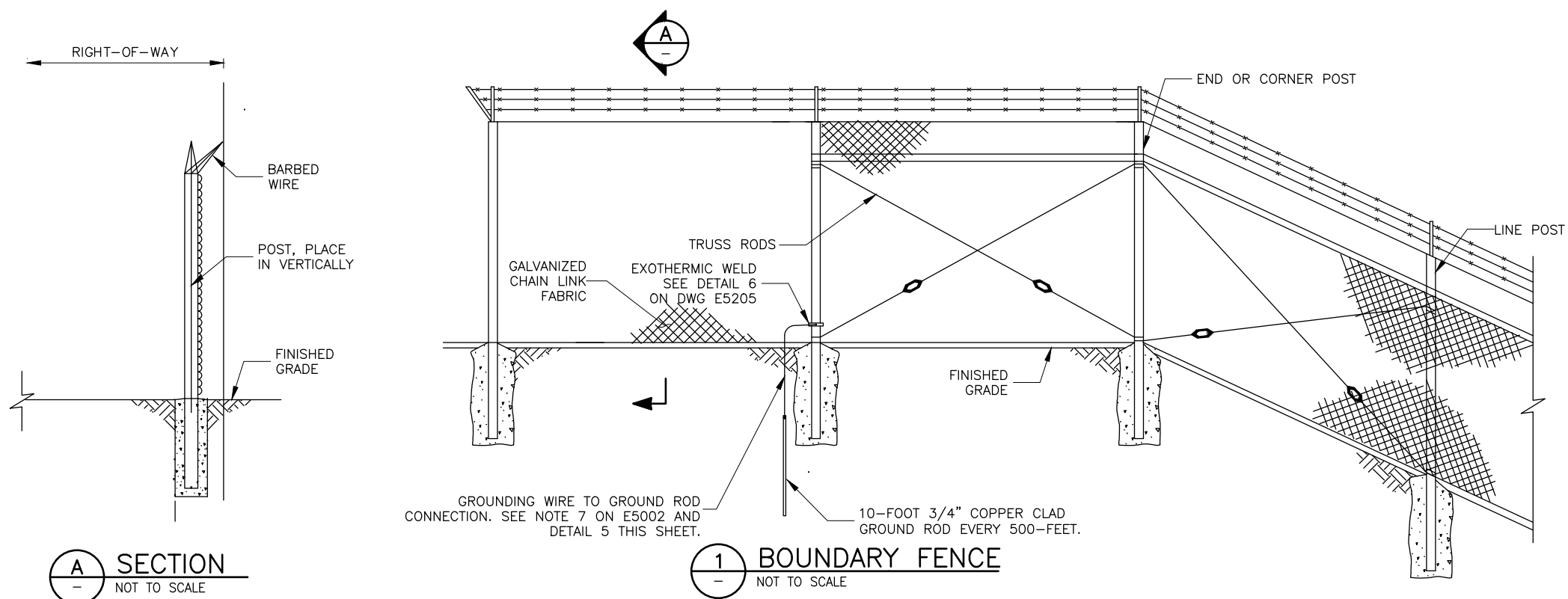


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STANDARD DRAWINGS

ELECTRIFICATION PROJECT
GROUNDING & BONDING BASIC DESIGN
WELD DETAILS

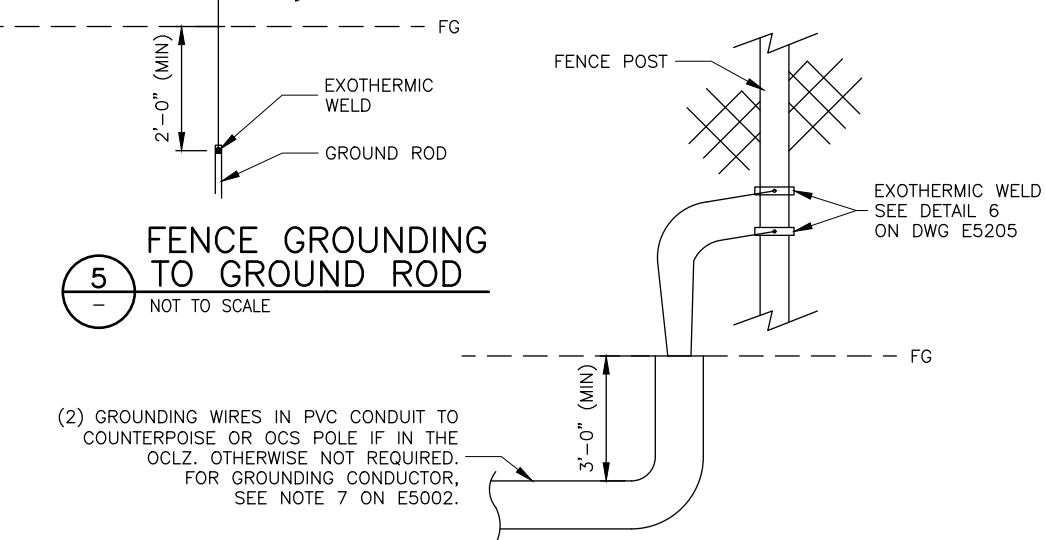
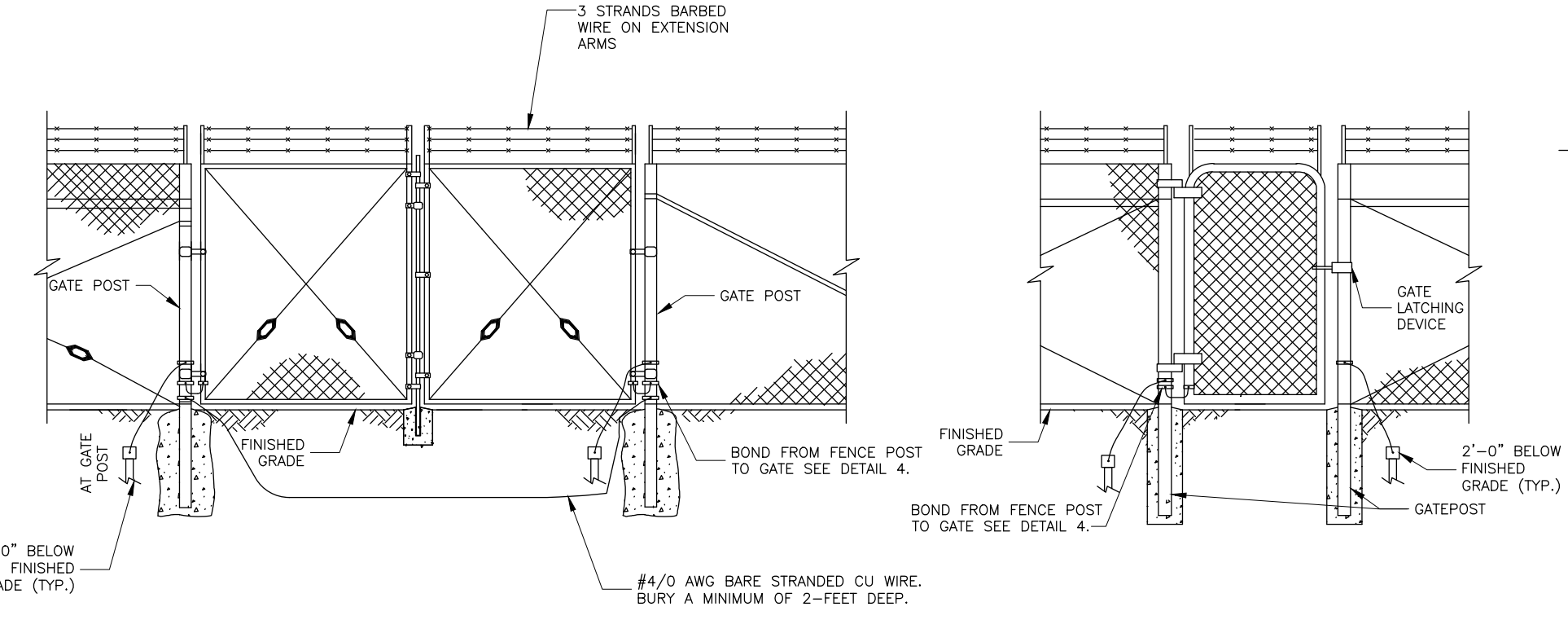
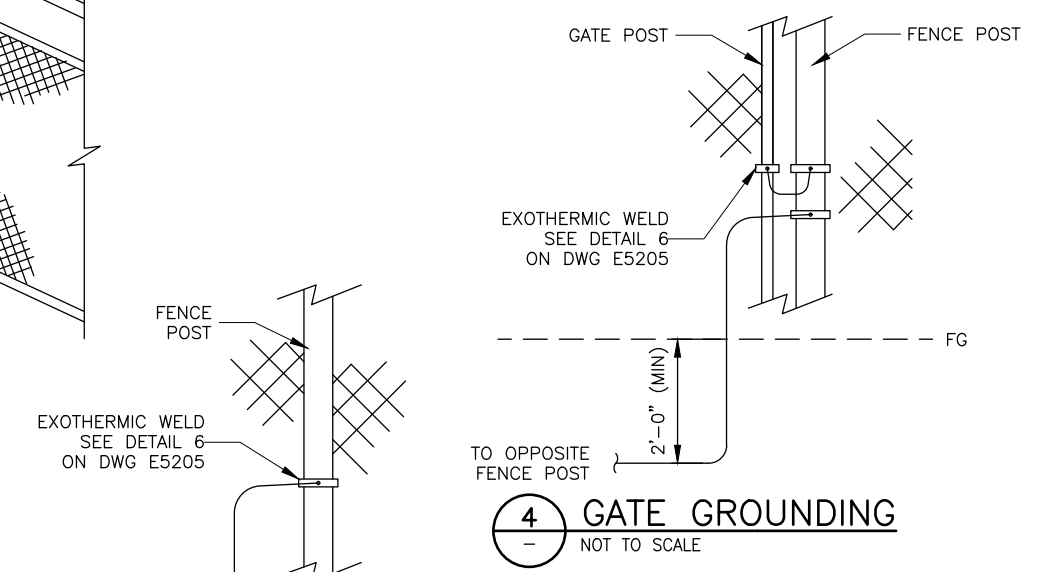
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STANDARD DRAWING NO.: E5503	



NOTES:

1. ALL PERMANENT FENCING AND GATES SHALL BE BONDED, GROUNDED AND INSULATED TO PREVENT ELECTRIC SHOCK.
2. WHEN THE FENCE IS WITHIN OCLZ THE FENCE WILL BE BONDED TO STATIC WIRE/COUNTERPOISE.
3. WHEN THE FENCE IS MORE THAN 45 FEET FROM CENTERLINE OF TRACK, GROUNDING AND BONDING OF THE FENCE IS NOT IN SCOPE OF WORK.
4. BAR FENCE INSIDE OCLZ SHALL BE BONDED TO NEAREST OCS POLE STATIC WIRE/COUNTERPOISE.
5. RAILING INSIDE OCLZ SHALL BE BONDED TO NEAREST OCS POLE STATIC WIRE/COUNTERPOISE.
6. DESIGN OF FENCES AND GATES IS NOT INCLUDED IN THIS SET OF DRAWINGS.

A SECTION
NOT TO SCALE



(2) GROUNDING WIRES IN PVC CONDUIT TO COUNTERPOISE OR OCS POLE IF IN THE OCLZ. OTHERWISE NOT REQUIRED. FOR GROUNDING CONDUCTOR, SEE NOTE 7 ON E5002.

3 PEDESTRIAN ACCESS GATE BOUNDARY FENCE (WALKING GATES)
NOT TO SCALE

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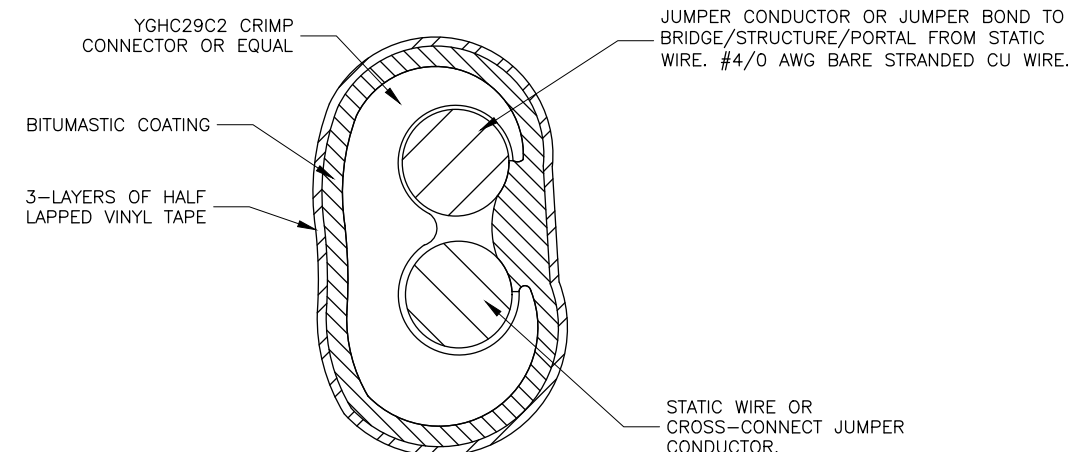
STANDARD DRAWINGS

ELECTRIFICATION PROJECT
GROUNDING & BONDING BASIC DESIGN
TYPICAL GATE AND FENCE

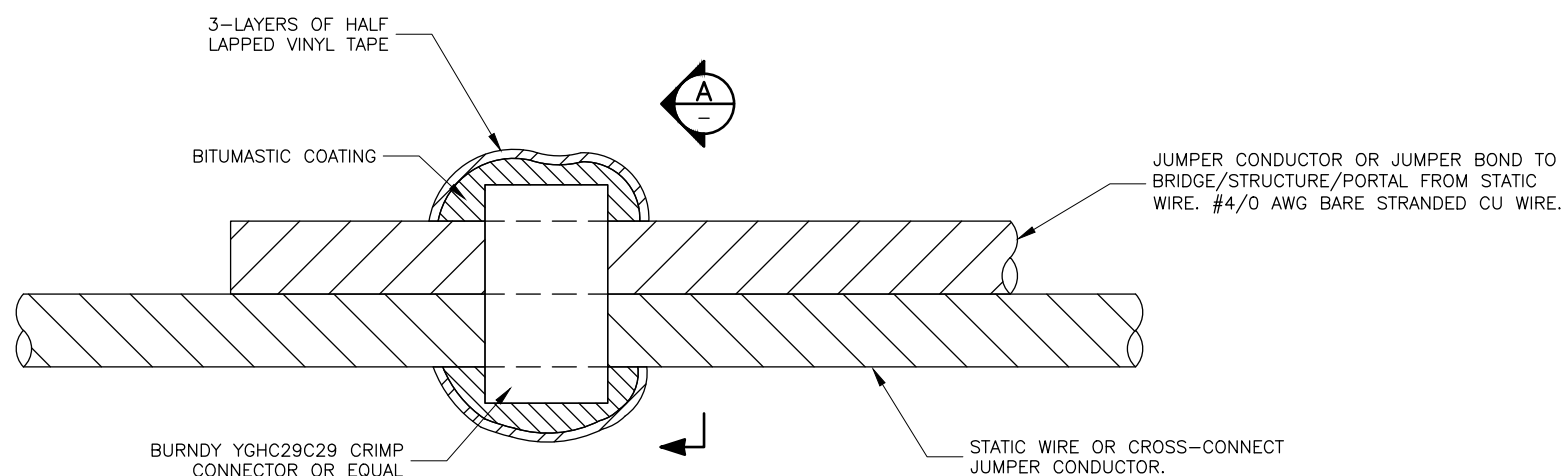
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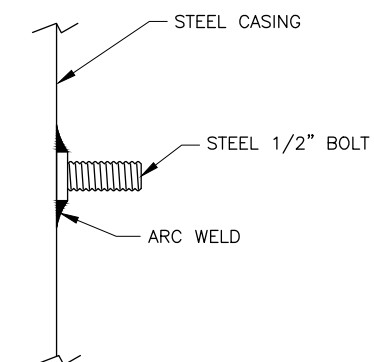


A BOND CONDUCTOR CRIMP
NOT TO SCALE



1 CONNECTION OF JUMPER CONDUCTOR OR JUMPER BOND TO STATIC WIRE OR CROSS-CONNECT JUMPER CONDUCTOR
NOT TO SCALE

NOTE: VINYL TAPE AND BITUMASTIC COATING IS NOT REQUIRED FOR CROSS-CONNECT JUMPER (COPPER TO COPPER).



2 GROUNDING STUD INSTALLATION
NOT TO SCALE

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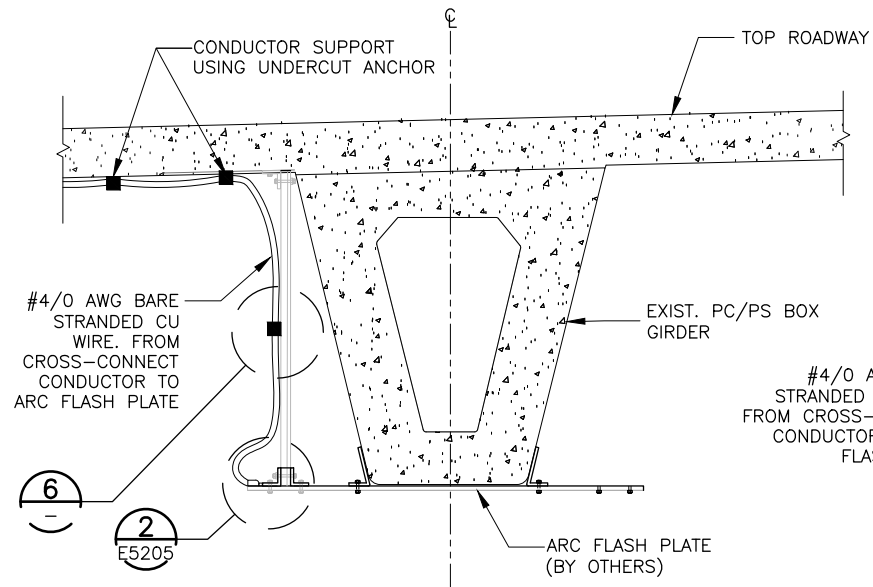
STANDARD DRAWINGS

ELECTRIFICATION PROJECT
GROUNDING & BONDING BASIC DESIGN
TYPICAL COMPRESSION
GROUND TAP CONNECTIONS

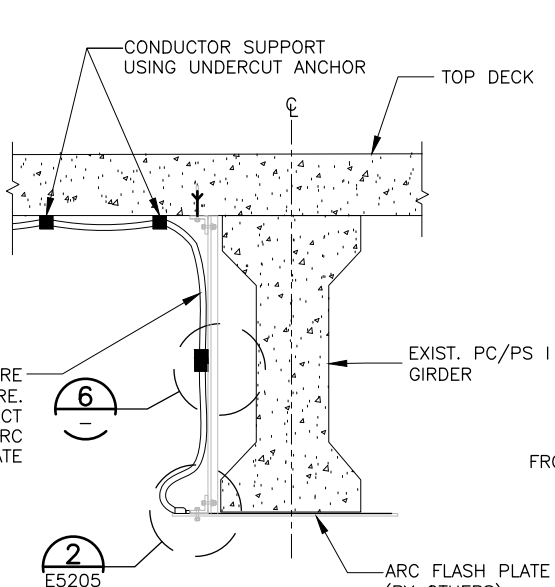
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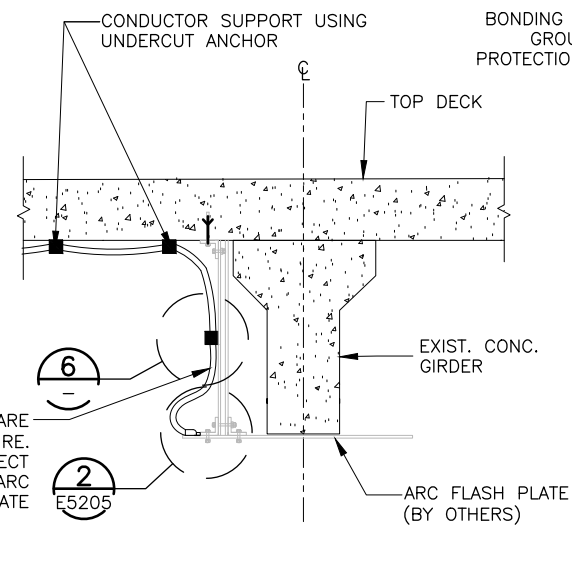
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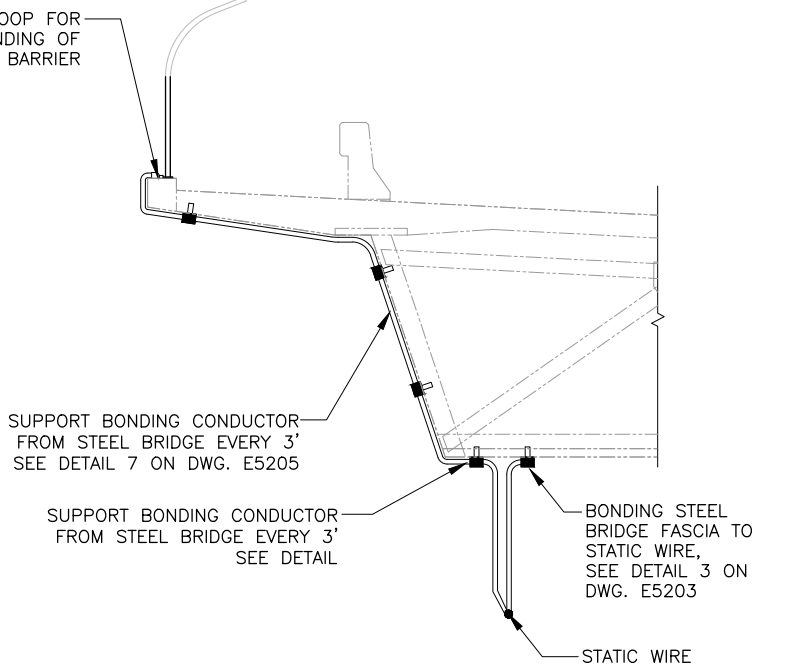
1 ARC FLASH SECTION, TYP.
N.T.S.



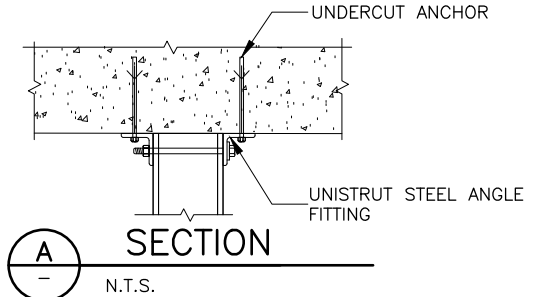
2 ARC FLASH SECTION, TYP.
N.T.S.



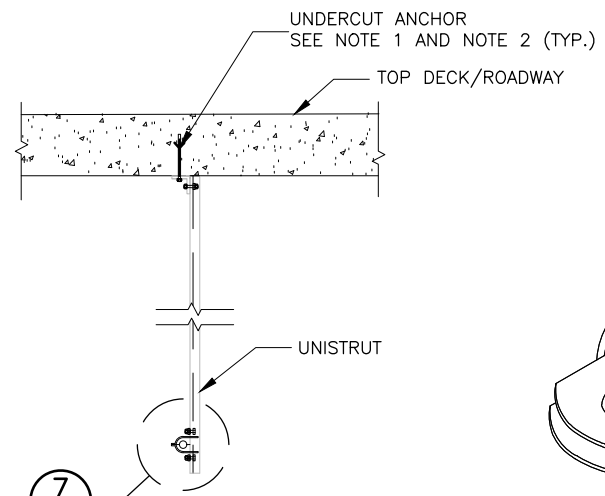
3 ARC FLASH SECTION, TYP.
N.T.S.



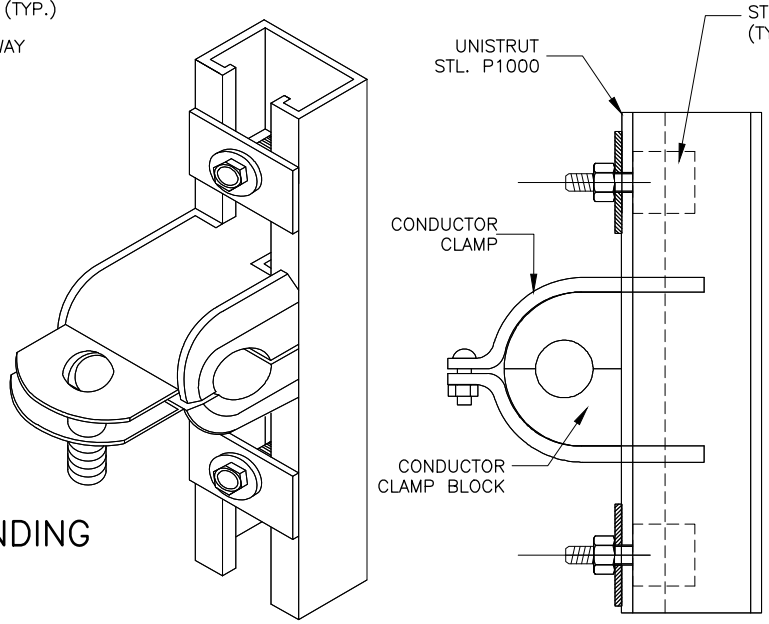
8 STEEL BRIDGE CONDUCTOR SUPPORT DETAIL
N.T.S.



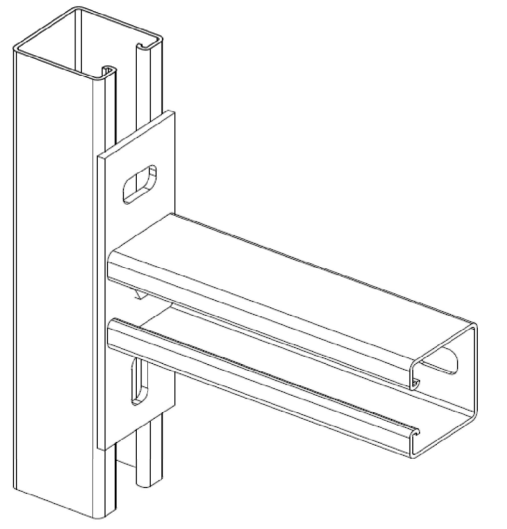
A SECTION
N.T.S.



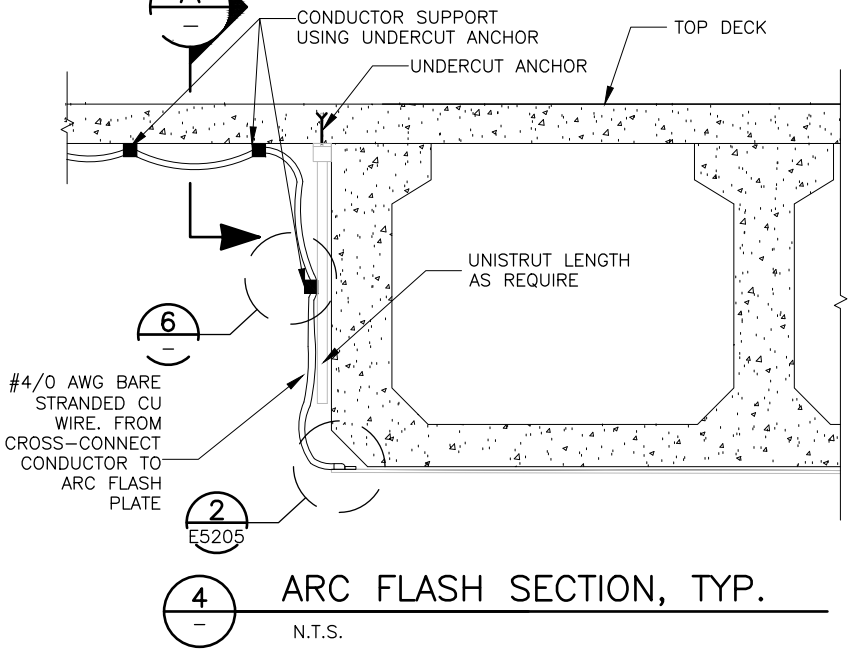
5 CONDUCTOR SUPPORT FOR BONDING FOR ARC FLASH PLATE TO ADJACENT ARC FLASH PLATE
N.T.S.



7 CONDUCTOR CLAMP
N.T.S.



6 DETAIL
N.T.S.
FOR CLAMP ATTACHMENT SEE DETAIL 7



4 ARC FLASH SECTION, TYP.
N.T.S.

NOTES:

1. ALL ATTACHMENTS TO CONCRETE BRIDGE SHALL BE APPROVED BY THE BRIDGE OWNERS.
2. FOR CONDUCTOR SUPPORT IN CONCRETE OR STEEL, SEE DETAIL 1 ON DRAWING E5205.

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Bin Zhang
DEPUTY DIRECTOR, ENGINEERING



STANDARD DRAWINGS

ELECTRIFICATION PROJECT
GROUNDING & BONDING BASIC DESIGN
TYPICAL ARC FLASH PLATE BONDING

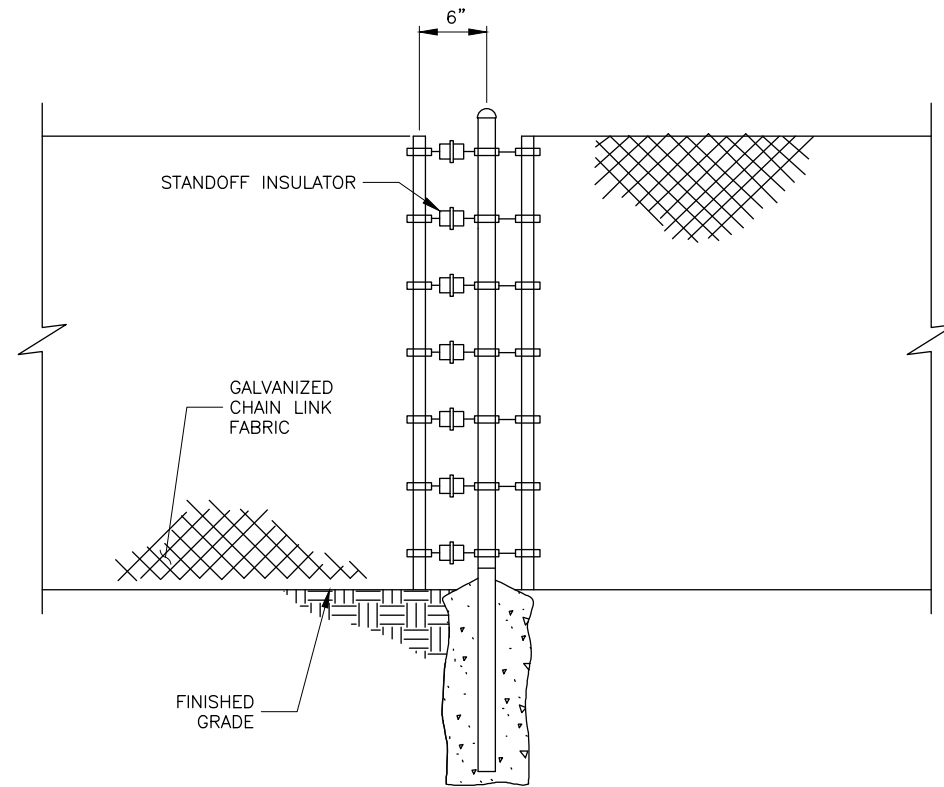
CADD FILE NAME:
E5507
REV: EDITION:
01012024
STANDARD DRAWING NO.:
E5507

REV	DATE	BY	CHK	APP	DESCRIPTION

01012024 EDITION

NOTES:

1. PROVIDE SHOP DRAWINGS PRIOR TO PROCUREMENT.
2. FENCE NOT SHOWN FOR CLARITY.
3. GROUND FENCE AT A MAXIMUM DISTANCE OF 500- FEET.
4. ISOLATE FENCE EVERY 1000- FEET, INSERT FENCE INSULATION AS SHOWN IN DETAIL 1.
5. FENCES LESS THAN 1000- FEET SHALL BE GROUNDED AT EACH END AND IN THE CENTER OF SECTION.



1 FENCE INSULATION
NOT TO SCALE

REV	DATE	BY	CHK	APP	DESCRIPTION

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Bin Zhang

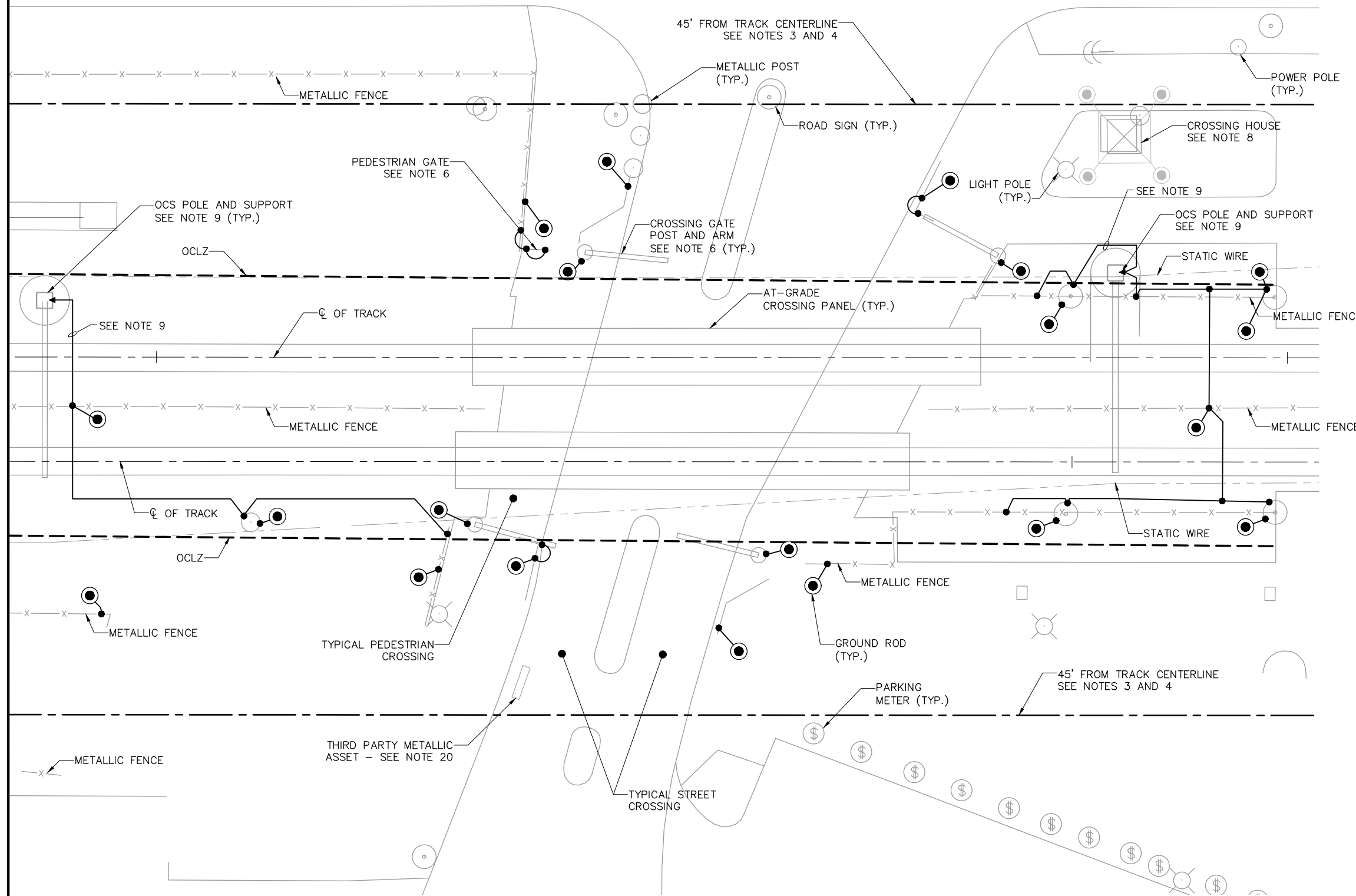
DEPUTY DIRECTOR, ENGINEERING

1250 San Carlos Avenue
San Carlos, CA 94070

STANDARD DRAWINGS

ELECTRIFICATION PROJECT
GROUNDING & BONDING BASIC DESIGN
TYPICAL FENCE INSULATION DETAILS

CADD FILE NAME: E5508	
REV:	EDITION: 01012024
STANDARD DRAWING NO.: E5508	



- NOTES:**
- THE GROUNDING AND BONDING SHOWN ON THIS DRAWING IS TYPICAL AND APPLICABLE TO ALL GRADE CROSSINGS UNDER THIS CONTRACT.
 - PROVIDE GROUNDING AND BONDING:
 - FOR SIGNAL/EQUIPMENT HOUSES, TO ACHIEVE A GROUND RESISTANCE OF LESS THAN 5 OHMS.
 - FOR GROUNDING AND BONDING REQUIREMENTS OF GRADE CROSSING PROTECTION EQUIPMENT, SEE NOTE 6.
 - FOR OTHER METALLIC OBJECTS, TO ACHIEVE A GROUND RESISTANCE OF LESS THAN 25 OHMS.
 - GROUNDING AND BONDING ALONG THE TRACKS, OUTSIDE OF 45 FEET FROM THE CENTERLINE OF THE TRACKS IS NOT IN THE SCOPE OF WORK.
 - GROUNDING AND BONDING OF FENCES ALONG THE TRACKS, OUTSIDE OF OCLZ (OVERHEAD CONTACT LINE ZONE) AND WITHIN 45 FEET FROM THE CENTERLINE OF THE TRACKS SHALL BE ACCORDING TO NEC, USING #4/0 AWG (MIN.), ANNEALED AND SOFT DRAWN BARE COPPER, AT 24" BELOW GRADE, WITHOUT BONDING TO STATIC WIRE.
 - GROUNDING AND BONDING OF FENCES ALONG THE TRACKS, INSIDE OF OCLZ (OVERHEAD CONTACT LINE ZONE) SHALL BE ACCORDING TO NEC, USING #4/0 AWG (MIN.), ANNEALED AND SOFT DRAWN BARE COPPER, AT 24" BELOW GRADE, WITH BONDING TO STATIC WIRE.
 - AT GRADE CROSSING, BOND ALL METALLIC OBJECTS SUCH AS THE PEDESTRIAN GATES, SIGNAL GATE, GATE SUPPORT AND FLASHER TOGETHER AND TO A GROUND ROD OR GROUND RODS TO ACHIEVE NOT MORE THAN 5 OHMS RESISTANCE TO GROUND. DO NOT BOND TO STATIC WIRE.
 - FOR GROUNDING AND BONDING OF SIGNAL MAST AND SIGNAL BRIDGE, REFER TO SIGNAL DRAWINGS.
 - FOR TYPICAL GROUNDING AND BONDING OF THE SIGNAL/COMMUNICATION HOUSE/CASE, REFER TO DRAWINGS E5102 AND E5103. FOR EXACT LOCATION AND DESIGN, REFER TO SIGNAL AND COMMUNICATION DESIGN PACKAGES.
 - STATIC WIRE CONNECTIONS SHALL BE MADE TO THE BASE OF THE NEAREST OCS SUPPORT STRUCTURE, REFER TO DRAWING E5302 DETAIL 3.
 - THIS DRAWING SHOWS THE TYPICAL ARRANGEMENT AT EACH GRADE CROSSING. THE LOCATION OF THE GROUNDING AND BONDING COMPONENTS SHALL BE INSTALLED BASED ON ACTUAL SITE CONDITIONS TO MINIMIZE THE IMPACT TO UNDERGROUND STRUCTURES.
 - ALL GROUND WIRE ROUTE SUBJECT TO VEHICULAR OR TRAIN TRAFFIC SHALL HAVE PROTECTION USING CONDUIT, PVC SCHEDULE 80, MINIMUM 24" BELOW BOTTOM OF RAILROAD TIE.
 - FOR TYPICAL NON-SIGNAL RELATED GATE, POST AND FENCE BONDING AND GROUNDING DETAILS SEE DRAWING E5505.
 - FOR GROUNDING AND BONDING OF FENCES, REFER TO DWG E5011, NOTES 2, 3 AND 4.
 - CONTRACTOR TO VERIFY IN THE FIELD IF FENCE IS WITHIN OCLZ.
 - FOR FENCE OUTSIDE THE OCLZ AND WITHIN 45' FROM CENTERLINE OF TRACK, SEE NOTE 3 ON DWG. E5011. NO WORK IS REQUIRED IF FENCE IS MORE THAN 45' FROM CENTERLINE OF THE TRACK.
 - IF FENCE INSIDE OCLZ IS LESS THAN 1000 FEET LONG, IT SHALL BE BONDED TO NEAREST OCS POLE, STATIC WIRE OR STATION COUNTERPOISE.
 - IF FENCE INSIDE OCLZ IS MORE THAN 1000 FEET LONG IT SHALL BE DIVIDED INTO 1000 FEET OR SMALLER SECTIONS WITH INSULATED INSERTS. SEE INSULATED FENCE INSERTS DETAIL 1 ON DWG. E5508. BOND FENCE SECTIONS PER NOTE 16 ABOVE.
 - CONNECTION BETWEEN GROUNDS WHETHER STATIC WIRE/COUNTERPOISE OR GROUND ROD SHALL NOT EXCEED 500 FEET. ALSO SEE NOTES 2, 4, 5 AND 6 ON DWG. E5011.
 - FOR ALL FENCES, CONTRACTOR SHALL VERIFY LENGTH OF THE FENCES IN THE FIELD. CONTRACTOR SHALL MAKE ALL METALLIC FENCES ELECTRICALLY CONTINUOUS EXCEPT AS NOTED ABOVE.
 - FOR THIRD PARTY METALLIC ASSETS GROUNDING AND BONDING, SEE DRAWING E5011, NOTE 6.


REV	DATE	BY	CHK	APP	DESCRIPTION

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San Carlos, CA 94070

STANDARD DRAWINGS

ELECTRIFICATION PROJECT
GROUNDING AND BONDING BASIC DESIGN
AT GRADE CROSSING
TYPICAL GROUNDING AND BONDING PLAN

CADD FILE NAME:
E6003

REV: EDITION:
 01012024

STANDARD DRAWING NO.:
E6003